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Report of the Legal Subcommittee on its fifty-fourth session, held in Vienna from 13 to 24 April 2015

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I. Introduction

A. Opening of the session

1. The Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space held its fifty-fourth session at the United Nations Office at Vienna from 13 to 24 April 2015 under the chairmanship of Kai-Uwe Schrogl (Germany).

2. The Subcommittee held 20 meetings.

B. Adoption of the agenda

3. At its 897th meeting, on 13 April, the Subcommittee adopted the following agenda:

1. Adoption of the agenda.
2. Statement by the Chair.
3. General exchange of views.
4. Information on the activities of international intergovernmental and non-governmental organizations relating to space law.
5. Status and application of the five United Nations treaties on outer space.
6. Matters relating to:
   (a) The definition and delimitation of outer space;
   (b) The character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union.
7. National legislation relevant to the peaceful exploration and use of outer space.
8. Capacity-building in space law.
9. Review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space.
10. General exchange of information and views on legal mechanisms relating to space debris mitigation measures, taking into account the work of the Scientific and Technical Subcommittee.
11. General exchange of information on non-legally binding United Nations instruments on outer space.
12. Review of international mechanisms for cooperation in the peaceful exploration and use of outer space.
13. Proposals to the Committee on the Peaceful Uses of Outer Space for new items to be considered by the Legal Subcommittee at its fifty-fifth session.

C. Attendance

4. Representatives of the following 56 States members of the Committee attended the session: Algeria, Argentina, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bolivia (Plurinational State of), Brazil, Bulgaria, Burkina Faso, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czech Republic, Ecuador, France, Germany, Greece, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Kenya, Lebanon, Luxembourg, Malaysia, Mexico, Morocco, Netherlands, Pakistan, Peru, Philippines, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Saudi Arabia, Slovakia, South Africa, Spain, Switzerland, Tunisia, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Venezuela (Bolivarian Republic of) and Viet Nam.

5. The Subcommittee decided to invite, at their request, observers for the Dominican Republic, El Salvador, Israel, Namibia, Oman, Panama, Qatar, Sri Lanka and the United Arab Emirates to attend the session and to address it, as appropriate, on the understanding that it would be without prejudice to further requests of that nature and that doing so would not involve any decision of the Committee concerning status.

6. The Subcommittee also decided to invite the observer for the European Union, at its request, to attend the session and to address it, as appropriate, on the understanding that it would be without prejudice to further requests of that nature and that doing so would not involve any decision of the Committee concerning status.

7. An observer for the International Telecommunication Union (ITU) attended the session.

8. The session was attended by observers for the following intergovernmental organizations having permanent observer status with the Committee: Asia-Pacific Space Cooperation Organization (APSCO), European Space Agency (ESA), European Telecommunications Satellite Organization (EUTELSAT-IGO), Inter-Islamic Network on Space Sciences and Technology (ISNET) and International Organization of Space Communications (Intersputnik).

9. The session was also attended by observers for the following non-governmental organizations having permanent observer status with the Committee: European Centre for Space Law (ECSL), European Space Policy Institute (ESPI), Ibero-American Institute of Aeronautic and Space Law and Commercial Aviation, International Association for the Advancement of Space Safety (IAASS), International Institute of Space Law (IISL), International Law Association (ILA), Secure World Foundation (SWF) and Space Generation Advisory Council (SGAC).

10. The Subcommittee had before it information concerning the applications of El Salvador, Israel, Oman, Qatar, Sri Lanka and the United Arab Emirates for membership in the Committee (A/AC.105/C.2/2015/CRP.4, A/AC.105/C.2/2015/CRP.22, A/AC.105/C.2/2015/CRP.7, A/AC.105/C.2/2015/CRP.3, A/AC.105/C.2/2015/CRP.5, A/AC.105/C.2/2015/CRP.6, respectively).

11. A list of the representatives of States, United Nations entities and other international organizations attending the session is contained in document A/AC.105/C.2/2015/INF/47.

D. Symposium

12. On 13 April, IISL and ECSL held a symposium on the theme "Space traffic management", co-chaired by Tanja Masson-Zwaan of IISL and Sergio Marchisio of ECSL. The symposium was opened with a statement of welcome, and the Subcommittee subsequently heard the following presentations: "From the 2006 to the 2016 space traffic management studies of the International Academy of Astronautics", prepared by Corinne Jorgenson and presented by Alexander Soucek; "Rights and obligations in the international commons: the case of outer space", by Stephan Hobe; "Space safety and space traffic management", by Isabelle Rongier; "Frequency management and space traffic management", by Yvon Henri; "Space traffic management and the governance of space activities", by Guoyu Wang; "International Civil Aviation Organization/Office for Outer Space Affairs Aerospace Symposium: an inter-agency effort on space traffic management", by Simonetta Di Pippo and Niklas Hedman; and "Road map to the stars: a conference report", by Diane Howard. Concluding remarks were made by the co-chairs of the symposium and the Chair of the Subcommittee. The presentations delivered during the symposium were made available on the website of the Office for Outer Space Affairs of the Secretariat (www.unoosa.org/oosa/en/COPUOS/lsc/2015/symposium.html).

13. The Subcommittee noted with appreciation that the symposium had constituted a valuable contribution to its work.

E. Adoption of the report of the Legal Subcommittee

14. At its 916th meeting, on 24 April, the Subcommittee adopted the present report and concluded the work of its fifty-fourth session.

II. General exchange of views

15. Statements were made by representatives of the following States members of the Committee during the general exchange of views: Algeria, Argentina, Austria, Belgium, Bulgaria, Brazil, Canada, Chile, China, Cuba, Czech Republic, France, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Luxembourg, Mexico, Morocco, Pakistan, Republic of Korea, Russian Federation, South Africa, Ukraine, United Kingdom, United States, Venezuela (Bolivarian Republic of) and Viet Nam. Statements were made by Chile on behalf of the Group of 77 and China and by Colombia on behalf of the Group of Latin American and Caribbean States. The observers for El Salvador, Oman and the United Arab Emirates also made statements. The observers for ESA, ESPI, SGAC and SWF also made statements.

16. At the 897th meeting, on 13 April, the Chair made a statement in which he highlighted the programme of work and organizational matters pertaining to the current session of the Subcommittee.

17. At the same meeting, the Director of the Office for Outer Space Affairs made a statement in which she reviewed the role of the Office in discharging the responsibilities of the Secretary-General under the United Nations treaties on outer space. The Director also reviewed Office activities and initiatives in areas relevant to the Subcommittee. She drew the attention of the Subcommittee to a reduction in the Office's resources and stressed the importance of the availability of resources for the successful implementation of the programme of work, as well as for the Office's ability to develop new initiatives and meet emerging needs.

18. The Subcommittee welcomed Luxembourg as a new member of the Committee.

19. The Subcommittee noted that it represented the main intergovernmental multilateral forum for developing space law.

20. The Subcommittee recalled paragraph 15 of General Assembly resolution 69/85, relating to ways and means of maintaining outer space for peaceful purposes, and welcomed the views submitted by States thus far on the report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (A/68/189).

21. Some delegations reaffirmed the commitment of their countries to the peaceful use and exploration of outer space and emphasized the following principles: universal and equal access to outer space for all countries without discrimination, regardless of their level of scientific, technical and economic development, as well as the equitable and rational use of outer space for the benefit of all humankind; non-appropriation of outer space, including the Moon and other celestial bodies, by claim of sovereignty, use, occupation or any other means; the non-militarization of outer space, which should never be used for the installation of weapons of any kind, and, as a common heritage of humankind, its strict use for the improvement of living conditions and peace among the peoples that inhabit our planet; and international cooperation in the development of space activities.

22. Some delegations expressed the view that the United Nations treaties and principles on outer space provided the basis for regulating the involvement of the governmental, non-governmental and private sectors in outer space.

23. Some delegations expressed the view that in order to harmonize the multilateral regime governing activities in outer space with new scientific and technological advances, it was necessary to review, update and strengthen the five United Nations treaties on outer space with a view to invigorating the principles that govern the space activities of States, strengthening international cooperation and making space technology accessible to the people.

24. Some delegations expressed the view that a universal comprehensive convention on outer space should be developed, with the aim of finding solutions for existing issues while fully respecting the fundamental principles incorporated in the existing United Nations treaties on outer space.

25. Some delegations reaffirmed the importance of preventing an arms race in outer space and noted the useful role that transparency and confidence-building measures could play in this regard.

26. Some delegations expressed the view that measures that would limit access to space for nations with emerging space capabilities should be avoided and that States should refrain from further developing the international legal framework in a manner that sets overly high standards or thresholds that could hinder the enhancement of capacity-building for developing countries.

27. The view was expressed that the rule of law in space was the cornerstone that could ensure the use of outer space for peaceful purposes, as well as its long-term sustainable development.

28. Some delegations expressed the view that the growth of actors engaged in space activities, and the increasing complexity of such activities, underscored the need for States to work within the Subcommittee for the improvement of the existing legal framework.

29. The view was expressed that attention should be paid to the review of the existing United Nations treaties on outer space, as well as other sources of law, such as international customary rules and soft-law standards.

30. Some delegations expressed the view that interaction between the Legal Subcommittee and the Scientific and Technical Subcommittee should be strengthened in order to synchronize the progressive development of space law with the major scientific and technical advances in this area.

31. Some delegations expressed the view that the Legal Subcommittee should keep abreast of the work of the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee.

32. Some delegations expressed the view that the Subcommittee should consider the legal basis for, and the modalities of, the right to self-defence in outer space in accordance with the Charter of the United Nations, as well as associated legal issues.

33. The view was expressed that all States should encourage private investment in the exploration and peaceful use of outer space.

34. The view was expressed that the Office for Outer Space Affairs should establish a technical cooperation section to help triangulate efforts among States and provide technical assistance to countries upon their request.

III. Information on the activities of international intergovernmental and non-governmental organizations relating to space law

35. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 4, entitled "Information on the activities of international intergovernmental and non-governmental organizations relating to space law", as a regular item on its agenda.

36. The representatives of Chile and the United States made statements under agenda item 4. Statements were also made by the observers for APSCO, ECSL, the Ibero-American Institute of Aeronautic and Space Law and Commercial Aviation, IISL, ILA and Intersputnik.

37. For its consideration of the item, the Subcommittee had before it the following:

(a) Note by the Secretariat containing information on activities relating to space law received from ECSL, the International Institute for the Unification of Private Law (Unidroit), ILA and Intersputnik (A/AC.105/C.2/106);

(b) Conference room paper containing information on activities relating to space law received from IISL (A/AC.105/C.2/2015/CRP.19).

38. The Subcommittee heard a presentation entitled "The Space Generation Advisory Council: a focus on the Space Law and Policy Project Group", by an observer for SGAC.

39. The Subcommittee noted with satisfaction that the activities of international intergovernmental and non-governmental organizations relating to space law had continued to contribute significantly to the study, clarification and development of space law and that those organizations had continued to organize conferences and symposiums, prepare publications and reports, and organize training seminars for practitioners and students, all of which were intended to broaden and advance knowledge of space law.

40. The Subcommittee noted that international intergovernmental organizations had an important role to play in the development, strengthening and furtherance of understanding of international space law.

41. The Subcommittee welcomed the information provided by the observer for IISL on its activities relating to space law (see A/AC.105/C.2/2015/CRP.19), including the outcome of the final round of the twenty-third Manfred Lachs Space Law Moot Court Competition, held in Toronto, Canada, on 3 October 2014; the outcome of the ninth Eilene M. Galloway Symposium on Critical Issues in Space Law, held in Washington, D.C., on 10 December 2014; information on the upcoming 58th Colloquium on the Law of Outer Space, to be held in Jerusalem from 12 to 16 October 2015; and information on the International Academy of Astronautics/IISL Conference on Climate Change and Disaster Management, held in Trivandrum, India, from 26 to 28 February 2015.

42. The Subcommittee welcomed the information provided by the observer for ECSL on its activities relating to space law (see A/AC.105/C.2/106), including information on the 2014 ECSL Practitioners' Forum, held in Paris on 14 March; on the European round of the Manfred Lachs Space Law Moot Court Competition, held in Wroclaw, Poland, from 14 to 17 May 2014; and on the outcome of the twenty-third ECSL Summer Course on Space Law and Policy, held in Geneva, Switzerland, from 1 to 12 September 2014.

43. The Subcommittee welcomed the information provided by the observer for APSCO on its activities relating to space law, including information on the United Nations/China/APSCO Workshop on Space Law, held in Beijing from 17 to 21 November 2014, and on the upcoming third APSCO Space Law and Policy Forum, to be held in Beijing in September 2015.

44. The Subcommittee welcomed the information provided by the observer for ILA on its activities relating to space law (see A/AC.105/C.2/106), including information on the seventy-sixth ILA Biennial Conference, organized jointly with

the American Society of International Law, held in Washington, D.C., from 7 to 11 April 2014.

45. The Subcommittee welcomed the information provided by the observer for the Ibero-American Institute of Aeronautic and Space Law and Commercial Aviation on its activities relating to space law, including on its latest event dedicated to space law, held in November 2014.

46. The Subcommittee welcomed the information provided by the observer for Intersputnik on its activities relating to space law (see A/AC.105/C.2/106), including information on the training and professional support that Intersputnik provided to its partners, and on international cooperation in the form of joint satellite projects.

47. In accordance with the agreement reached by the Subcommittee at its fifty-third session, in 2014 (see A/AC.105/1067, para. 45), Unidroit made available to the Subcommittee information on recent developments in relation to the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets (see A/AC.105/C.2/106). The Subcommittee noted that the Preparatory Commission for the Establishment of the International Registry for Space Assets, acting as the Provisional Supervisory Authority of the future international registry, had successfully held three sessions. At its third session, in September 2014, the Preparatory Commission had finalized the text of the registry regulations except in regard to the issue of the identification criteria for parts of spacecraft.

48. The Subcommittee agreed that the representative of Unidroit should be invited to update the Subcommittee at its fifty-fifth session on further developments relating to the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets.

49. The Subcommittee agreed that it was important to continue the exchange of information on recent developments in the area of space law between the Subcommittee and international intergovernmental and non-governmental organizations and that such organizations should once again be invited to report to the Subcommittee, at its fifty-fifth session, on their activities relating to space law.

IV. Status and application of the five United Nations treaties on outer space

50. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 5, entitled "Status and application of the five United Nations treaties on outer space", as a regular item on its agenda.

51. The representatives of Algeria, Brazil, Canada, Germany, Japan, Spain, the Netherlands, the Republic of Korea, the Russian Federation, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 5. A statement was also made by the representative of Chile on behalf of the Group of Latin American and Caribbean States. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

52. The Subcommittee heard a presentation entitled "Space object registration by the European Space Agency: current policy and practice", by the observer for ESA.

53. At its 897th meeting, on 13 April, the Subcommittee reconvened its Working Group on the Status and Application of the Five United Nations Treaties on Outer Space under the chairmanship of Jean-François Mayence (Belgium). The Subcommittee commended the outgoing Chair of the Working Group for his dedication in chairing the Working Group and his tireless efforts in moving the discussions in the Working Group forward.

54. At its 913th meeting, on 23 April, the Subcommittee endorsed the report of the Chair of the Working Group, contained in annex I to the present report.

55. The Subcommittee had before it the following:

(a) Conference room paper on the status of international agreements relating to activities in outer space as at 1 January 2015 (A/AC.105/C.2/2015/CRP.8);

(b) Notes by the Secretariat containing responses to the set of questions provided by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space, received from Germany (A/AC.105/C.2/2015/CRP.11) and Canada (A/AC.105/C.2/2015/CRP.21);

(c) Overview by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space on the responses from States members and permanent observers of the Committee to the set of questions provided by the Chair, contained in the report of the Legal Subcommittee on its fifty-third session, document A/AC.105/1067, annex I, appendix (A/AC.105/C.2/2015/CRP.12);

(d) Answers from the Chair of the Space Law Committee of ILA to questions provided by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space (A/AC.105/C.2/2015/CRP.25).

56. The Subcommittee noted that, as at 1 January 2015, the status of the five United Nations treaties on outer space was as follows:

(a) The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty), had 103 States parties and had been signed by 25 additional States;

(b) The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue Agreement) had 94 States parties and had been signed by 24 additional States; two international intergovernmental organizations had declared their acceptance of the rights and obligations established under the Agreement;

(c) The Convention on International Liability for Damage Caused by Space Objects (Liability Convention) had 92 States parties and had been signed by 21 additional States; three international intergovernmental organizations had declared their acceptance of the rights and obligations established under the Convention;

(d) The Convention on Registration of Objects Launched into Outer Space (Registration Convention) had 62 States parties and had been signed by 4 additional

States; three international intergovernmental organizations had declared their acceptance of the rights and obligations established under the Convention;

(e) The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement) had 16 States parties and had been signed by 4 additional States.

57. The Subcommittee noted the fortieth anniversary of the Registration Convention, one of the most important instruments in the application and implementation of obligations under the United Nations treaties on outer space. That Convention, which had been adopted on 12 November 1974, was opened for signature on 14 January 1975 and entered into force on 15 September 1976, constituted the foundation for the registration of objects launched into outer space.

58. The Subcommittee noted with appreciation that the Secretariat continued to update, on an annual basis, the status of international agreements relating to activities in outer space; the current update had been made available to the Subcommittee in conference room paper A/AC.105/C.2/2015/CRP.8. The Subcommittee requested the Secretariat to include, in future updates, the contact information of the depositaries of those agreements.

59. Some delegations expressed the view that the United Nations treaties on outer space formed an indispensable legal basis for supporting the increasing scale of space activities and strengthening international cooperation in the peaceful uses of outer space. Those delegations welcomed the growing adherence to the United Nations treaties on outer space and encouraged those States that had not yet become parties to the treaties to consider doing so.

60. Some delegations expressed the view that it was necessary to review, update and strengthen the five United Nations treaties on outer space with a view to invigorating the guiding principles that govern the space activities of States and to filling any legal lacunae in the current international legal regime on outer space, as well as strengthening international cooperation and facilitating the exchange of space technology and expertise for the benefit of all people. Those delegations were of the view that such reviewing and updating should not undermine the fundamental principles underlying the existing legal regime, but should rather enrich and further develop those principles.

61. Some delegations expressed the view that it was essential to ensure that all States adhere to and implement the five United Nations treaties on outer space, which form the legal foundation for governing outer space activities and have enabled States and their people to enjoy tremendous benefits from such activities. Those delegations were of the view that in cases where legal uncertainties might be found in those treaties, actors conducting activities in outer space could make use of non-legally binding instruments.

62. Some delegations expressed the view that the five United Nations treaties on outer space were a basis for the regulation of the participation and the responsibility of both Governments and non-governmental organizations and that they strengthened the safety and security of space activities. Those delegations were of the view that the legal regime governing activities in outer space should ensure that space research and space activities benefit the quality of life and well-being of human beings and the prosperity of current and future generations.

63. Some delegations expressed the view that in order to meet the challenges associated with the rapid development of space activities, which could not have been foreseen at the time when the five United Nations treaties were negotiated, it was necessary to reach an agreement on updating the existing legal regime on outer space.

64. Some delegations expressed the view that the wide array of non-binding mechanisms and initiatives being developed to supplement the five United Nations treaties on outer space, such as the European Union-led initiative on a draft international code of conduct for outer space activities and the set of draft guidelines for the long-term sustainability of outer space activities prepared by the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee, not only yielded practical benefits in the present but could also influence the future creation of treaties on outer space.

65. The view was expressed that the existing shortcomings of and loopholes found in the current United Nations treaties on outer space, in particular the Liability Convention and the Registration Convention, were among the reasons for the low rate of adherence to the United Nations treaties on outer space.

66. The view was expressed that the general principles of the Outer Space Treaty had become international customary law, since almost all States conducting activities in outer space had ratified that Treaty and acted in accordance with its provisions; furthermore, there was no evidence of practice contrary to the Treaty on the part of States that had not acceded to it.

67. The view was expressed that the Legal Subcommittee should examine the work of the International Seabed Authority related to a draft framework for the regulation of exploitation activities in the international deep seabed area and on the development of financial terms for such exploitation in order to examine possible linkages between the commercial regime for the deep seabed and the questions arising from article XI of the Moon Agreement.

68. The view was expressed that, while under article VI of the Outer Space Treaty States bore responsibility for national activities in outer space, that did not mean that a State was liable under article VII of that Treaty or under the Liability Convention for damage caused by a space object owned or operated by an enterprise registered in that State, when the enterprise had requested that the launch should take place from a State other than the enterprise's State of registration. The delegation expressing that view was also of the view that liability in such an instance could be appropriately allocated in a bilateral agreement between the State of registration and the State that had launched the space object.

69. The view was expressed that the registration of space objects was one of the key elements of the United Nations treaties on outer space and that the registration principles contained in the Outer Space Treaty and in the Registration Convention were sufficient, if properly applied. The delegation expressing that view was also of the view that in accordance with articles VI and VII of the Outer Space Treaty, the launching State remained responsible for all the space objects it had launched. As a consequence, and to avoid the use of "flags of convenience", a transfer of registration was possible only between launching States.

70. The view was expressed that the establishment of a national registry of objects launched into outer space in itself complied with the Registration Convention.

71. Some delegations, expressed the view, however, that the Democratic People's Republic of Korea was in clear violation of Security Council resolutions 1718 (2006), 1874 (2009) and 2087 (2013), as the launch on 12 December 2012 of Kwangmyongsong 3-2 had been conducted with the use of ballistic missile technology, and that it was important to continue to emphasize strongly that the Democratic People's Republic of Korea must not conduct any further actions in violation of those Security Council resolutions.

72. The view was expressed that the circulation of document ST/SG/SER.E/INF/31, containing the notification by the Democratic People's Republic of Korea of the establishment of a national registry of objects launched into outer space, in accordance with article II of the Registration Convention, and of document ST/SG/SER.E/662, concerning the registration data furnished by the Democratic People's Republic of Korea, could be construed as a legitimization by the Secretariat of the attempt by the Democratic People's Republic of Korea to disguise the launch of its space object using ballistic missile technology and to circumvent those Security Council resolutions. The delegation expressing that view drew attention to the report of the Panel of Experts established pursuant to Security Council resolution 1874 (2009) dated 23 February 2015 (S/2015/131, annex), which pointed out that the National Aerospace Development Administration, the national contact point of the Democratic People's Republic of Korea according to document ST/SG/SER.E/INF/31, was an alias of the Korean Committee for Space Technology, an entity named on the sanctions list maintained by the Committee established pursuant to Security Council resolution 1718 (2006), and requested that a formal notice quoting the relevant content of the Secretary-General's letter contained in document S/2013/108 and the 2014 report of the Panel of Experts (S/2014/147, annex) be placed on the website of the Office for Outer Space Affairs along with the registration information provided by the Democratic People's Republic of Korea.

73. At the Subcommittee's 913th meeting, on 23 April 2015, the Director of the Office for Outer Space Affairs stated that the Office took note of the concerns raised by the delegation of the Republic of Korea and the statement by Japan concerning the notification by the Democratic People's Republic of Korea of the establishment of a national registry of objects launched into outer space, in accordance with article II of the Registration Convention, and of the establishment of a national focal point for the registration of space objects, pursuant to paragraph 2 (c) of General Assembly resolution 62/101. She informed the Subcommittee that the Office had immediately communicated the notification to the Executive Office of the Secretary-General, the Office of Legal Affairs, the Department of Political Affairs of the Secretariat and the Coordinator of the Panel of Experts established pursuant to Security Council resolution 1874 (2009). She also informed the Subcommittee that the statements made by the Republic of Korea and Japan on 14 April 2015 had already been communicated to the above-mentioned offices, departments and individuals. On the basis of the advice received from them, the Director of the Office for Outer Space Affairs reminded the Subcommittee that the function of the Secretary-General and the Office for Outer Space Affairs with respect to notifications from States parties to the Registration Convention and Member States

was an administrative and technical one. Thus, it had been the established practice of the Office not to add information of the nature indicated by the Republic of Korea to notifications. In that light, it was noted that the Office for Outer Space Affairs was not in a position to post the requested notices on its website.

74. The view was expressed that it was regrettable that the results of the illegal act committed by the Democratic People's Republic of Korea, which had been condemned by the Security Council on a number of occasions, were being treated simply as an administrative and technical matter by the Office. The delegation expressing that view found it very regrettable that the advice received by the aforementioned offices of the United Nations did not fully reflect the provisions of the Charter of the United Nations, the resolutions adopted by the Security Council and the report submitted by the Panel of Experts in document S/2015/131. The delegation stated that the issue should be re-examined and discussed at the fifty-eighth session of the Committee on the Peaceful Uses of Outer Space, to be held in June 2015.

V. Matters relating to the definition and delimitation of outer space and the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union

75. Pursuant to General Assembly resolution 69/85, the Subcommittee considered, as a regular item on its agenda, agenda item 6, entitled:

"Matters relating to:

"(a) The definition and delimitation of outer space;

"(b) The character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union."

76. The representatives of Algeria, Belgium, Brazil, Canada, China, Colombia, France, Mexico, the Netherlands, the Republic of Korea, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 6. The representative of Chile made a statement on behalf of the Group of Latin American and Caribbean States, and a statement on behalf of the Group of 77 and China. A statement was also made by the observer for the United Arab Emirates. The observer for ITU also made a statement. During the general exchange of views, statements relating to item 6 were made by the representatives of other member States.

77. At its 897th meeting, on 13 April 2015, the Legal Subcommittee reconvened its Working Group on the Definition and Delimitation of Outer Space under the chairmanship of José Monserrat Filho (Brazil). In accordance with the agreement reached by the Subcommittee at its thirty-ninth session and endorsed by the

Committee at its forty-third session, the Working Group was convened to consider only matters relating to the definition and delimitation of outer space.

78. The Working Group held 4 meetings. The Subcommittee, at its 913th meeting, on 23 April, endorsed the report of the Chair of the Working Group, contained in annex II to the present report.

79. For its consideration of the item, the Subcommittee had before it the following:

(a) Note by the Secretariat on questions on the definition and delimitation of outer space: replies from Member States (A/AC.105/889/Add.15 and 16);

(b) Note by the Secretariat on questions on suborbital flights for scientific missions and/or for human transportation (A/AC.105/1039/Add.4 and 5).

80. The Subcommittee noted with satisfaction that a joint Aerospace Symposium on the theme "Emerging space activities and civil aviation: challenges and opportunities" had been organized by the International Civil Aviation Organization (ICAO) and the Office for Outer Space Affairs and held in Montreal, Canada, from 18 to 20 March 2015. That unprecedented event had brought together 350 participants from around the globe representing the aviation and space communities and had succeeded in strengthening the dialogue between the relevant legal and regulatory actors and in enhancing the common understanding of the challenges and opportunities related to commercial space transportation development. The Symposium agreed on follow-up symposiums to be held in the United Arab Emirates in 2016 and in Vienna in 2017.

81. The Subcommittee noted that the Office for Outer Space Affairs and ICAO would lead the learning group set up as an interactive forum for discussion under this framework and that States members of the Committee were invited to nominate their experts for membership in the learning group.

82. Some delegations expressed the view that scientific and technological progress, the commercialization of outer space, the participation of the private sector, emerging legal questions and the increasing use of outer space in general had made it necessary for the Subcommittee to consider the question of the definition and delimitation of outer space. The delegations expressing that view were also of the view that the definition and delimitation of outer space would help to establish a single legal regime regulating the movement of an aerospace object and to bring about legal clarity in the implementation of space law and air law, as well as clarify the issues of the sovereignty and international responsibility of States and the boundary between airspace and outer space.

83. The view was expressed that the definition and delimitation of outer space were important for ensuring the safety of aerospace operations.

84. The view was expressed that an agreement on a clear definition of the boundaries between outer space and airspace would allow the Committee and the Subcommittee to concentrate on developing and improving legal instruments whose application was not restricted to one single realm of space activities and would create the legal certainty that would provide commercial operators with the assurances they needed in order to carry out their activities. The delegation expressing that view was also of the view that if the Subcommittee failed to act, it

might lose its leading role on the issue, and that would be tantamount to neglecting its mandate.

85. The view was expressed that the further development of aerospace activities could lead to the creation of relevant customary norms, which could assist in the regulation of such activities without the need to define and delimit outer space.

86. Some delegations expressed the view that in relation to the definition and/or delimitation of outer space, it would be preferable to focus on the function and purpose of an object rather than on its location, in order to determine if and when space law would govern its activities.

87. The view was expressed that it was important to consider the interrelationship between air law and space law.

88. Some delegations expressed the view that States should continue to operate in the current framework, which functioned well, until such time as there was a demonstrated need and a practical basis for developing a definition or delimitation of outer space. The delegations expressing that view were also of the view that at present any attempt to define and delimit outer space would be a theoretical exercise that could unintentionally complicate existing activities and that might not be adaptable to continuing technological developments.

89. Some delegations expressed the view that the delimitation of outer space was closely connected with the management of space activities and that the Subcommittee and its Working Group could first concentrate on relevant matters that needed practical solutions, such as suborbital flights or launches from flying objects. The delegations expressing that view were also of the view that international cooperation could be helpful, as exemplified by the recent undertaking by the Office for Outer Space Affairs and ICAO.

90. Some delegations expressed the view that progress in the definition and delimitation of outer space could be achieved through cooperation with ICAO.

91. Some delegations expressed the view that the Subcommittee should reinvigorate its efforts to reach consensus on the issue of the definition and delimitation of outer space and called upon States to make every effort necessary to reach a positive and legally sound solution.

92. Some delegations expressed the view that the geostationary orbit — a limited natural resource clearly in danger of saturation — needed to be used rationally and should be made available to all States, irrespective of their current technical capacities. That would provide States with the possibility of having access to the geostationary orbit under equitable conditions, bearing in mind, in particular, the needs and interests of developing countries, as well as the geographical position of certain countries, and taking into account the processes of ITU and relevant norms and decisions of the United Nations.

93. Some delegations expressed the view that the geostationary orbit was a limited natural resource with great potential for the implementation of a wide array of programmes for the benefit of all States, and that it was at risk of becoming saturated, thereby threatening the sustainability of space activities in that environment; that its exploitation should be rationalized; and that it should be made available to all States, under equitable conditions, taking into particular account the

needs of developing countries. Those delegations were also of the view that it was important to use the geostationary orbit in compliance with international law, in accordance with the decisions of ITU and within the legal framework established in the relevant United Nations treaties, while giving consideration to the contributions of space activities to sustainable development and the achievement of the Millennium Development Goals.

94. Some delegations expressed the view that the geostationary orbit was part of outer space, that it was not subject to national appropriation by claim of sovereignty, by means of use, repeated use or occupation, or by any other means, and that its utilization was governed by the Outer Space Treaty and ITU treaties. The delegations expressing that view were also of the view that the provisions of articles I and II of the Outer Space Treaty made it clear that a party to the Treaty could not appropriate any part of outer space, such as an orbital location in the geostationary orbit, either by claim of sovereignty or by means of use, including repeated use, or by any other means.

95. The view was expressed that the geostationary orbit, as a limited natural resource clearly in danger of saturation, must be used rationally, efficiently, economically and equitably. That principle was deemed fundamental for safeguarding the interests of developing countries and countries in certain geographical positions, as set out in article 44, paragraph 196.2, of the Constitution of ITU, as amended by the ITU Plenipotentiary Conference held in 1998.

96. The view was expressed that the utilization by States of the geostationary orbit on the basis of "first come, first served" was unacceptable and that the Subcommittee should therefore develop a legal regime guaranteeing equitable access to orbital positions for States, in accordance with the principles of the peaceful use and non-appropriation of outer space.

97. The view was expressed that special attention should be given to equitable access for all States to orbit-spectrum resources in geostationary orbit while recognizing their potential with respect to social programmes that benefited the most underserved communities, making educational and medical projects possible, guaranteeing access to information and communications technology and improving links to necessary sources of information in order to strengthen social organization, as well as promoting knowledge and the exchange thereof without commercial interests acting as intermediaries.

98. Some delegations expressed the view that, in order to ensure the sustainability of the geostationary orbit, it was necessary to keep that issue on the agenda of the Subcommittee and to explore it further, through the creation of appropriate working groups and legal and technical intergovernmental panels, as necessary. Those delegations were of the view that working groups or intergovernmental panels with technical and legal expertise should be established to promote equal access to the geostationary orbit, and called for the greater participation of ITU in the work of the Subcommittee under those matters.

VI. National legislation relevant to the peaceful exploration and use of outer space

99. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 7, entitled "National legislation relevant to the peaceful exploration and use of outer space", as a regular item on its agenda.

100. The representatives of Algeria, Austria, Brazil, Japan, Mexico, the Netherlands and the Republic of Korea made statements under agenda item 7. The observer for ITU also made a statement. During the general exchange of views, statements relating to the item were made by the representatives of other member States.

101. In accordance with the request made by the Subcommittee at its fifty-third session, in 2014, an information handout on issues related to registration, authorization, debris mitigation and frequency management with respect to small and very small satellites had been jointly developed by the Office for Outer Space Affairs and ITU. The publication was made available to the Subcommittee in conference room paper A/AC.105/C.2/2015/CRP.17 and was also published on the website of the Office for Outer Space Affairs (www.unoosa.org/oosa/en/COPUOS/lsc/small-sat-handout.html).

102. The Subcommittee heard a presentation entitled "Current status of Japan's space policy and development of legal frameworks", by the representative of Japan.

103. The Subcommittee commended the Office and ITU for preparing the handout, which would become an important source of information for the benefit of space actors intending to operate such satellites.

104. The Subcommittee agreed that the handout could also be further promoted through the efforts of States members of the Committee.

105. The Subcommittee noted with satisfaction that some States members of the Committee had already begun to implement the recommendations of General Assembly resolution 68/74.

106. The Subcommittee noted various activities of member States in strengthening or developing their national space laws and policies, as well as in reforming or establishing the governance of national space activities. In that connection, the Subcommittee also noted that those activities were aimed at improving management, increasing competitiveness, involving academia, better responding to challenges posed by the development of space activities and better implementing international obligations.

107. The Subcommittee noted with satisfaction the increasing number of space-related international cooperation programmes and projects. In that connection, the Subcommittee noted the importance of the development of space legislation by States, as national regulatory frameworks played a significant role in regulating and promoting such cooperation activities.

108. The Subcommittee reiterated that it was important to take into account the increased level of commercial and private activities in outer space in the context of developing a national space-related regulatory framework, particularly with respect to the responsibilities of States regarding their national space activities.

109. The Subcommittee agreed that the discussions under this item were important and that they enabled States to gain an understanding of existing national regulatory frameworks, share experiences on national practices and exchange information on national legal frameworks.

110. The Subcommittee agreed that it was important to continue to exchange information regularly on developments in the area of national space-related regulatory frameworks. In that regard, the Subcommittee encouraged member States to continue to submit to the Secretariat texts of their national space laws and regulations and to provide updates and inputs for the schematic overview of national regulatory frameworks for space activities.

VII. Capacity-building in space law

111. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 8, entitled "Capacity-building in space law", as a single issue/item for discussion.

112. The representatives of Algeria, Canada, China, Colombia, Costa Rica, France, Germany, Indonesia, Japan, Kenya, Mexico, Morocco, the Republic of Korea, the Russian Federation, South Africa and Venezuela (Bolivarian Republic of) made statements under agenda item 8. The representative of Chile made a statement on behalf of the Group of 77 and China, and a statement on behalf of the Group of Latin American and Caribbean States. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

113. The Subcommittee had before it the following:

(a) Report on the United Nations/China/Asia-Pacific Space Cooperation Organization Workshop on Space Law on the Role of National Space Legislation in Strengthening the Rule of Law, held in Beijing from 17 to 20 November 2014 (A/AC.105/1089);

(b) Proceedings of the United Nations/China Workshop on Space Law: The Role of National Space Legislation in Strengthening the Rule of Law, available on the website of the Office for Outer Space Affairs as ST/SPACE/66;

(c) Conference room paper containing a directory of educational opportunities in space law (A/AC.105/C.2/2015/CRP.9);

(d) Conference room paper containing information submitted by Austria on actions and initiatives to build capacity in space law (A/AC.105/C.2/2015/CRP.16).

114. The Subcommittee heard the following presentations made under the agenda item:

(a) "The Brazilian Air Force University: supporting the Brazilian space programme", by the representative of Brazil;

(b) "Regulatory aspects of small satellite remote operations in radio amateur bands", by the representative of Spain;

(c) "Japan's capacity-building in space law: recent progress", by the representative of Japan.

115. The Subcommittee agreed that capacity-building, training and education in space law were of paramount importance to national, regional and international efforts to further develop the practical aspects of space science and technology, especially in developing countries, and to increasing knowledge of the legal framework within which space activities were carried out. It was emphasized that the Subcommittee had an important role to play in that regard.

116. The Subcommittee noted with appreciation that a number of national, regional and international efforts to build capacity in space law were being undertaken by governmental and non-governmental entities. Those efforts included encouraging universities to offer modules and seminars on space law; providing fellowships for graduate and postgraduate education in space law; assisting in the development of national space legislation and policy frameworks; organizing workshops, seminars and other specialized activities to promote greater understanding of space law; providing financial and technical support for legal research; preparing dedicated studies, papers, textbooks and publications on space law; supporting space law moot court competitions; supporting the participation of young professionals in regional and international meetings relating to space law; providing for training and other opportunities to build experience, in particular through internships with space agencies; and supporting entities dedicated to the study of and research relating to space law.

117. The Subcommittee recalled the importance of promoting regional and interregional cooperation through organizations such as APSCO and ESA, and through regional forums such as the Asia-Pacific Regional Space Agency Forum (APRSAF), the Space Conference of the Americas and the African Leadership Conference on Space Science and Technology for Sustainable Development.

118. The Subcommittee noted that some Member States provided financial assistance to enable students to attend the Manfred Lachs Space Law Moot Court Competition, held each year during the International Astronautical Congress.

119. The Subcommittee noted that the agenda item on national legislation relevant to the peaceful exploration and use of outer space and the agenda item on the review of international mechanisms for cooperation in the peaceful exploration and use of outer space had great potential to further the contribution of the Subcommittee to capacity-building, as the discussions and exchange of information would be of practical value to States in setting up their space activities.

120. The Subcommittee welcomed the establishment of the Regional Centre for Space Science and Technology Education, affiliated to the United Nations, at Beihang University in Beijing, as it would supplement space law teaching and training opportunities for countries in the Asia-Pacific region.

121. Some delegations expressed the view that the regional centres for space science and technology education could offer specialized training and scholarships in space law and related fields such as space data, space traffic management and the general use of space for socioeconomic development.

122. The Subcommittee noted with appreciation the holding of the ninth United Nations workshop on space law, on the theme "The role of national space legislation

in strengthening the rule of law". The workshop, held in Beijing from 17 to 21 November 2014, had been hosted by the Government of China and organized jointly by the Office for Outer Space Affairs, APSCO and the China National Space Administration.

123. The Subcommittee noted that the workshop had discussed the role of national space legislation in strengthening the rule of law to adequately address the complexity of regulatory mechanisms and policy development in space activities. The workshop had taken note of General Assembly resolution 60/1, entitled "2005 World Summit Outcome", in which the Assembly acknowledged that good governance and the rule of law at the national and international levels were essential for sustained economic growth, sustainable development and the eradication of poverty and hunger.

124. The Subcommittee noted that the workshop had conducted a review of the objectives of international space law development and noted that, in view of the growing number of benefits derived from space science and technology applications and the continued expansion of space activities, greater attention must be paid to national regulatory and policy developments.

125. The Subcommittee also noted that the workshop had welcomed General Assembly resolution 68/74, on recommendations on national legislation relevant to the peaceful exploration and use of outer space, in which the Assembly had provided a set of elements for consideration, as appropriate, by States when enacting regulatory frameworks for national space activities, in accordance with their national legal systems. The workshop agreed that action could be taken by other States to cover those elements when developing national regulatory frameworks.

126. The Subcommittee noted that the workshops organized by the Office for Outer Space Affairs in cooperation with host countries were a valuable contribution to capacity-building in space law and international cooperation in the peaceful uses of outer space.

127. Some delegations expressed the view that it was necessary to strengthen the capacity of the Office for Outer Space Affairs with regard to capacity-building and training in space law.

128. The Subcommittee reaffirmed its satisfaction at the completion of the education curriculum on space law and the updated web-based compilation of reading materials, found on the website of the Office for Outer Space Affairs.

129. Some delegations expressed a willingness to assist the regional centres for space science and technology education, affiliated to the United Nations, to facilitate the introduction of the curriculum in their respective education programmes, as it was a dynamic educational tool that could be easily used by educators from different professional backgrounds.

130. Some delegations requested the Office for Outer Space Affairs to strengthen its efforts to support capacity-building in space law in the Latin American and Caribbean region, in particular through the organization of seminars or workshops.

131. The view was expressed that, while not all nations were spacefaring nations, they could still be affected by outer space-related incidents. In order to anticipate

the enforcement of liability measures, it was necessary that all countries know their obligations and rights. With the growing involvement of actors in space-related activities, both public and private, building capacity in space law was more urgent than ever before.

132. The Subcommittee noted with satisfaction that the Office for Outer Space Affairs had updated the directory of education opportunities in space law (A/AC.105/C.2/2015/CRP.9), including with information on available fellowships and scholarships, and agreed that the Office should continue to update the directory. In that connection, the Subcommittee invited member States to encourage contributions at the national level for the future updating of the directory.

133. The Subcommittee expressed its appreciation to the delegation of Germany for having presented volume III of the Cologne Commentary on Space Law to delegations at the present session of the Subcommittee, as a contribution to capacity-building in space law. Together with volume I, which had been presented in 2010, and volume II, presented in 2013, it constituted a complete, article-by-article commentary on all five United Nations treaties and other legal instruments on outer space.

134. The Subcommittee recommended that States members and permanent observers of the Committee inform the Subcommittee, at its fifty-fifth session, of any action taken or planned at the national, regional or international level to build capacity in space law.

VIII. Review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space

135. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 9, entitled "Review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space", as a single issue/item for discussion.

136. The representatives of Canada, Mexico, the Netherlands, the Republic of Korea, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 9. The representative of Chile made a statement on behalf of the Group of 77 and China, and a statement on behalf of the Group of Latin American and Caribbean States. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

137. The Subcommittee recalled that the Safety Framework for Nuclear Power Source Applications in Outer Space (A/AC.105/934), adopted by the Scientific and Technical Subcommittee at its forty-sixth session, in 2009, and endorsed by the Committee at its fifty-second session, also in 2009, had considerably advanced international cooperation in ensuring the safe use of nuclear power sources in outer space and had facilitated the development of international space law.

138. The Legal Subcommittee noted with satisfaction the extension of the multi-year workplan of the Working Group on the Use of Nuclear Power Sources in Outer Space to 2017 (A/AC.105/1065, annex II, para. 9).

139. Some delegations expressed the view that it was exclusively States, irrespective of their level of social, economic, scientific or technical development, that had an obligation to engage in regulatory activity associated with the use of nuclear power sources in outer space and to adapt national legislation to relevant international standards. Those delegations were also of the view that Governments bore international responsibility for national activities involving the use of nuclear power sources in outer space conducted by governmental and non-governmental organizations and that such activities must be beneficial and not detrimental to humanity.

140. Some delegations expressed the view that the Principles Relevant to the Use of Nuclear Power Sources in Outer Space (General Assembly resolution 47/68) should be reviewed with a view to developing binding international standards to provide a legal framework for the use of nuclear power sources in outer space.

141. Some delegations expressed the view that a revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space was not warranted.

142. Some delegations expressed the view that there should be greater coordination and interaction between the Scientific and Technical Subcommittee and the Legal Subcommittee in order to promote the development of a legally binding framework for the use of nuclear power sources in outer space.

143. Some delegations expressed the view that the Safety Framework for Nuclear Power Source Applications in Outer Space should be officially presented to the Legal Subcommittee for examination.

144. Some delegations expressed the view that appropriate interaction between the two Subcommittees was required in order to develop strategies, long-term planning and regulations related to the use of nuclear power sources in outer space, considering the recommendations included in the Safety Framework.

145. The view was expressed that a balanced approach between meeting the current needs of space activities and the risk arising from the use of nuclear power sources should be taken into consideration with a view to further work of the Subcommittee.

146. Some delegations expressed the view that more consideration should be given to the use of nuclear power sources in outer space, specifically in the geostationary orbit and lower atmosphere of the Earth, in order to address the legal aspects of the problem of potential collisions of nuclear-powered space objects in orbit, the incidents or emergencies that could be created by the accidental re-entry of such objects into the Earth's atmosphere and their impact on its surface, and the consequences for the health and lives of people and for the ecosystem.

147. Some delegations expressed the view that more attention should be paid to the legal issues associated with the use of satellite platforms with nuclear power sources in Earth orbits, including the geostationary orbit, in the light of reported failures and collisions that posed a high risk to humanity. Those delegations were also of the view that it was necessary to discuss the inclusion of new principles aimed at improving the provisions relating to the safety of the use of nuclear energy sources and their adaptation to new technologies, as well as to study in depth the use of such platforms with a view to promoting the development of legally binding rules.

148. Some delegations expressed the view that the use of nuclear power sources in outer space must be as limited as possible, and should be based on a thorough safety assessment to reduce the risk of accidental exposure of the public to harmful radiation or radioactive materials.

149. The view was expressed that the Principles Relevant to the Use of Nuclear Power Sources in Outer Space should be modified by deleting, from principle 3 (Guidelines and criteria for safe use), paragraphs 2 (a)(iii) and 3 (a), which referred to the use of nuclear reactors and radioisotope generators in Earth orbits.

150. The view was expressed that it was necessary to involve experts, industry, academia and the competent authorities in the development of standards relating to the use of nuclear power sources in outer space.

151. The view was expressed that the establishment of an independent nuclear safety review panel to regulate the use of nuclear power sources in outer space could be considered.

152. The view was expressed that the use of nuclear power sources in outer space should be allowed only in the case of deep space missions and only when other power sources had been considered and rejected.

153. The view was expressed that research should be conducted to find alternative power sources to replace the use of nuclear power sources in outer space.

IX. General exchange of information and views on legal mechanisms relating to space debris mitigation measures, taking into account the work of the Scientific and Technical Subcommittee

154. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 10, entitled "General exchange of information and views on legal mechanisms relating to space debris mitigation measures, taking into account the work of the Scientific and Technical Subcommittee", as a single issue/item for discussion.

155. The representatives of Brazil, Canada, the Czech Republic, Germany, Japan, Mexico, the Netherlands, the Republic of Korea, the Russian Federation, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 10. The representative of Chile made a statement on behalf of the Group of 77 and China, and a statement on behalf of the Group of Latin American and Caribbean States. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

156. The Subcommittee had before it a conference room paper on the compendium of space debris mitigation standards adopted by States and international organizations (A/AC.105/C.2/2015/CRP.20).

157. The Subcommittee recalled with satisfaction that the endorsement by the General Assembly, in its resolution 62/217, of the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space had been an

important step in providing all spacefaring nations with guidance on how to mitigate the problem of space debris.

158. The Subcommittee noted with satisfaction that some States were implementing space debris mitigation measures consistent with the Space Debris Mitigation Guidelines of the Committee and/or the Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines and that other States had developed their own space debris mitigation standards based on those guidelines. The Subcommittee also noted that some States were using the IADC Space Debris Mitigation Guidelines, the European Code of Conduct for Space Debris Mitigation and International Organization for Standardization (ISO) standard 24113:2011 (Space systems: space debris mitigation requirements) as references in their regulatory frameworks for national space activities.

159. The Subcommittee noted with satisfaction that some States had taken measures to incorporate internationally recognized guidelines and standards related to space debris into relevant provisions in their national legislation.

160. The Subcommittee noted that some States had strengthened their national mechanisms governing space debris mitigation through the nomination of governmental supervisory authorities, the involvement of academia and industry and the development of new legislative norms, instructions, standards and frameworks.

161. The Subcommittee expressed its appreciation to Canada, the Czech Republic and Germany for their initiative and action to develop a compendium of space debris mitigation standards adopted by States and international organizations.

162. The Subcommittee also expressed its appreciation to the Secretariat for the establishment of a dedicated web page for maintaining the compendium, and for making the information on the compendium available to the Scientific and Technical Subcommittee for consideration at its fifty-second session.

163. Some delegations expressed the view that since the future of space activities would depend largely on space debris mitigation measures, research should be deepened in the areas of technology for space debris observation, space debris environmental modelling and technologies to protect space systems from space debris and to limit substantially the creation of additional space debris. Those delegations were of the view that the outcome of the research should be used to improve the Space Debris Mitigation Guidelines of the Committee and to keep them updated.

164. Some delegations expressed the view that the Legal Subcommittee should undertake a legal analysis of the Space Debris Mitigation Guidelines of the Committee.

165. The view was expressed that it was necessary to involve experts, industry, academia and the competent authorities in the development of standards and criteria for strengthening the Space Debris Mitigation Guidelines of the Committee.

166. The view was expressed that the development of a legally binding instrument for space debris mitigation would not automatically result in its comprehensive acceptance and implementation.

167. Some delegations expressed the view that the transformation of technical debris mitigation guidelines into a legally binding instrument was not necessary, as

spacefaring nations were motivated to reduce space debris by their self-interest in preserving the safety and sustainability of space activities.

168. Some delegations expressed the view that non-binding international principles and guidelines on space debris mitigation should be flexible and easily adaptable to new technological and situational circumstances and that it was not reasonable to establish debris mitigation standards in international law at present.

169. The view was expressed that a non-binding approach could be effective and benefit all nations if implemented domestically through policies, regulations and standards.

170. The view was expressed that it was necessary to examine the compendium of space debris mitigation standards adopted by States and international organizations in order to determine whether and how the information contained in the compendium could be used to update the Space Debris Mitigation Guidelines of the Committee.

171. The view was expressed that the compendium of space debris mitigation standards could be a starting point for international regulation.

172. Some delegations expressed the view that information on actions to reduce the creation of space debris should be made available to the Subcommittee, in particular by those States that were largely responsible for creating space debris and by the States that had the capacity to take action with regard to space debris mitigation.

173. The view was expressed that reporting on the status of implementation of the Space Debris Mitigation Guidelines of the Committee would contribute to improving transparency and developing confidence-building measures among States.

174. Some delegations expressed the view that the Subcommittee should consider the issue of space debris in connection with the growing number of deployments of small satellites.

175. Some delegations expressed the view that the Subcommittee should pay greater attention to space debris in the geostationary orbit.

176. Some delegations expressed the view that the Subcommittee should pay greater attention to space debris derived from space platforms with nuclear power sources on board and from the collision of such objects with space debris, and to technology for monitoring space debris.

177. Some delegations expressed the view that the issue of space debris should not be treated in a way that limited access to outer space or impaired the development of space capabilities by the least developed or developing countries, and that it was necessary to take into account the principle of proportional responsibility for space debris removal.

178. Some delegations expressed the view that the removal of large pieces of debris was necessary to prevent the proliferation of space debris and that the removal should be carried out by those space actors that were responsible for space debris generation.

179. Some delegations expressed the view that addressing the issue of active removal required the clarification of a number of legal questions.

180. The view was expressed that any active debris removal operations should be based on legal documents developed under the auspices of the United Nations, and that the development of a legal instrument on active debris removal outside the framework of the United Nations was not acceptable.

181. Some delegations expressed the view that cooperation between the Legal Subcommittee and the Scientific and Technical Subcommittee was increasing and that the progress achieved by the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee could be of benefit for the Legal Subcommittee.

182. Some delegations expressed the view that cooperation between the Legal Subcommittee and the Scientific and Technical Subcommittee should be strengthened and that the Subcommittees should cooperate in developing binding and non-legally binding rules for space debris mitigation. Those delegations were of the view that the results obtained in the working groups of the Scientific and Technical Subcommittee should be officially presented to the Legal Subcommittee for examination and for the identification of legal issues that should be addressed by the Legal Subcommittee.

183. The view was expressed that the recommendations of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities could also contribute to the mitigation of space debris.

184. The Subcommittee agreed that States members of the Committee and international intergovernmental organizations having permanent observer status with the Committee should be invited to further contribute to the compendium of space debris mitigation standards adopted by States and international organizations by providing or updating the information on any legislation or standards adopted with regard to space debris mitigation, using the template provided for that purpose. The Subcommittee also agreed that all other States Members of the United Nations should be invited to contribute to the compendium, encouraging States with such regulations or standards to provide information on them.

X. General exchange of information on non-legally binding United Nations instruments on outer space

185. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 11, entitled "General exchange of information on non-legally binding United Nations instruments on outer space", as a single issue/item for discussion.

186. The representatives of Austria, Brazil, Canada, Chile, China, Cuba, the Czech Republic, France, Germany, Greece, Italy, Japan, Mexico, the Netherlands, the Republic of Korea, the Russian Federation, Spain, the United Kingdom, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 11. A statement was made by Chile on behalf of the Group of Latin American and Caribbean States. Statements were made by the observers for ESA and ILA. A statement was also made by the representative of Luxembourg, together with the observer for the European Union, on behalf of the European Union. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

187. The Subcommittee had before it a conference room paper prepared by Japan entitled "Questionnaire on general exchange of information on non-legally binding United Nations instruments on outer space" (A/AC.105/C.2/2015/CRP.24/Rev.1).

188. The Subcommittee was informed by the observer for the European Union that, in response to General Assembly resolutions 68/50 and 69/38, as well as to the report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, diplomatic negotiations on the European Union-led initiative on a draft international code of conduct for outer space activities would take place in New York from 27 to 31 July 2015, and that all United Nations Member States would be invited.

189. Some delegations expressed concern that the European Union-led initiative on a draft international code of conduct for outer space activities had not been discussed in the Committee or its Subcommittees, and were of the view that negotiations on it had thus not been given the proper United Nations mandate. Those delegations were of the view that in order to imbue that European Union-led initiative with a universal character, such negotiations should be conducted within the framework of the United Nations, in particular in the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space.

190. The Subcommittee welcomed the exchange of information under this agenda item and noted that existing non-legally binding United Nations instruments related to space activities had played an important role by complementing and supporting the United Nations treaties on outer space, and that they continued to be an effective means to address emerging challenges posed by the increase and diversification of activities in outer space, and to serve as a basis for ensuring the safe and sustainable use of outer space.

191. The Subcommittee encouraged States members of the Committee, as well as international intergovernmental organizations having permanent observer status with the Committee, to respond, on a voluntary basis and as appropriate, to the questionnaire contained in A/AC.105/C.2/2015/CRP.24/Rev.1, and to submit their responses to the delegation of Japan, which was invited to prepare a compilation of responses to be submitted to the Subcommittee during its fifty-fifth session.

192. Some delegations expressed the view that the goals set forth in the questionnaire could be more appropriately addressed in discussions of the Subcommittee under agenda item 7, on national legislation relevant to the peaceful exploration and use of outer space.

193. Some delegations expressed the view that the questionnaire limited the discussion to the existing non-legally binding United Nations instruments.

194. The Subcommittee recalled paragraph 197 of the report of the Legal Subcommittee on its fifty-third session, in 2014 (A/AC.105/1067), whereby the Subcommittee agreed that under this agenda item, "member States could, as appropriate, discuss other non-legally binding instruments on outer space, as well as the relationship between legally binding and non-legally binding instruments."

195. Some delegations expressed the view that discussions under this agenda item should not be confined to examining solely the non-legally binding United Nations instruments, and that the task of the Legal Subcommittee was to examine all non-legally binding instruments, those existing as well as those under development,

such as the draft international code of conduct for outer space activities being developed under the European Union-led initiative, that could have a long-term impact on the peaceful use of outer space, as well as the safety and long-term sustainability of outer space activities.

196. Some delegations expressed the view that only existing non-legally binding United Nations instruments should be discussed under this agenda item, in accordance with the objectives associated with the item, as described in document A/AC.105/C.2/L.291.

197. Some delegations expressed the view that the scope of this agenda item should be broad, in line with the agreement mentioned in paragraph 197 of the report of the Legal Subcommittee on its fifty-third session, and that the item should be entitled "General exchange of information on non-legally binding instruments and initiatives related to the peaceful use of outer space".

198. Some delegations expressed the view that the exchange of information under this agenda item would assist States in their deliberations and would shed light on the use of non-legally binding United Nations instruments on outer space. The delegations expressing that view were also of the view that the discussion under this agenda item should not be limited to the questionnaire itself.

199. Some delegations expressed the view that discussions under this agenda item should focus on the implementation by member States of the non-legally binding United Nations instruments, rather than on the instruments as such. The delegations expressing that view were also of the view that a review of implementation measures by member States would shed light on the effectiveness of the instruments and that the questionnaire was of the utmost importance for enhancing discussions under this agenda item.

200. Some delegations expressed the view that an exchange of information on the non-legally binding principles and technical guidelines developed by the Committee on the Peaceful Uses of Outer Space was especially welcome in view of the recommendation contained in the report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (A/68/189) that Member States take measures to implement, to the greatest extent practicable, principles and guidelines endorsed on the basis of consensus by the Committee on the Peaceful Uses of Outer Space and the General Assembly.

201. The view was expressed that the Committee on the Peaceful Uses of Outer Space was the appropriate international multilateral forum for discussions on the further development of space law and its application, and that the deliberations on the European Union-led initiative on a draft international code of conduct for outer space activities should be conducted in the Committee in the overall context of the topic on the long-term sustainability of outer space activities and in view of the recommendations of the Group of Governmental Experts.

202. The view was expressed that one of the most important roles for international lawyers in facilitating successful international cooperation was that of identifying the optimal cooperative mechanism in any given case, including when a non-legally binding mechanism might facilitate the objectives of cooperation better than a treaty. The delegation expressing that view was also of the view that the Principles Relating to Remote Sensing of the Earth from Outer Space, which were widely

credited with fostering a successful international regime in remote sensing to the benefit of all States, and the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (also called the International Charter on Space and Major Disasters) served as excellent examples of such mechanisms.

203. The Subcommittee agreed that this item should be retained on the agenda of the Subcommittee at its fifty-fifth session to continue the debate on both its substance and its scope.

XI. Review of international mechanisms for cooperation in the peaceful exploration and use of outer space

204. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 12, entitled "Review of international mechanisms for cooperation in the peaceful exploration and use of outer space", as an item under its five-year workplan (A/AC.105/1003, para. 179). In accordance with the workplan for 2015, the Subcommittee continued to conduct an exchange of information on the range of existing international space cooperation mechanisms.

205. The representatives of Algeria, China, France, Japan, Mexico, the Netherlands, the Republic of Korea, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 12. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

206. At its 896th meeting, on 13 April, the Subcommittee reconvened its Working Group on the Review of International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space, under the chairmanship of Setsuko Aoki (Japan). At its 914th meeting, on 23 April 2015, the Subcommittee endorsed the report of the Chair of the Working Group, contained in annex III to the present report.

207. The Subcommittee had before it the following documents:

(a) Note by the Secretariat on the review of international mechanisms for cooperation in the peaceful exploration and use of outer space, containing information received from Japan and Spain (A/AC.105/C.2/107);

(b) Conference room paper on the review of international mechanisms for cooperation in the peaceful exploration and use of outer space, containing information received from Austria (A/AC.105/C.2/2015/CRP.14);

(c) Conference room paper containing a note by the Secretariat on the categorization of international mechanisms for cooperation in the peaceful exploration and use of outer space (A/AC.105/C.2/2015/CRP.15).

208. The Subcommittee heard the following presentations:

(a) "Japan Aerospace Exploration Agency (JAXA) examples of international mechanisms for cooperation in the peaceful exploration and use of outer space", by the representative of Japan;

(b) "The need for an international approach and framework for new, developing activities below 200 km", by the observer for IAASS.

209. The Subcommittee noted the breadth, diversity and important elements of the mechanisms utilized in space cooperation, including legally binding multilateral and bilateral agreements; memorandums of understanding; non-legally binding arrangements, principles and technical guidelines; multilateral coordination mechanisms through which space-system operators coordinated the development of applications of space systems for the benefit of the environment, human security and welfare, and development; international intergovernmental organizations, such as APSCO and ESA; and a variety of international and regional forums, including the African Leadership Conference on Space Science and Technology for Sustainable Development, the Asia-Pacific Regional Space Agency Forum and the Space Conference of the Americas.

210. The view was expressed that the Subcommittee should play a positive role in fostering international cooperation so as to strengthen the design of the system of international cooperation and develop an effective and practical cooperative mechanism for the purpose of safeguarding peace, security and the rule of law in outer space.

211. The view was expressed that international initiatives for cooperation on specific aspects of the exploration and use of outer space, such as Earth observation and global navigation, were conceived for the purpose of uniting different space actors so as to maximize synergies, thereby fostering information-sharing and promoting the use of space applications and services, including in developing countries.

212. Some delegations expressed the view that it would be important to give consideration, as appropriate, to possible ways to enable knowledge and technology transfer, capacity-building and other means of cooperation so that more countries and people would be able to gain access to outer space for the benefit of their welfare and socioeconomic conditions.

213. The view was expressed that international space cooperation should be based on the concept of inclusive development, which would enable all States, regardless of the level of their economic development, to enjoy benefits derived from the use of space applications.

214. The view was expressed that the mechanisms for international space cooperation and the enhancement of the rule of law in outer space had been shown, in practice, to be complementary in nature: international cooperation served as an important means for advancing the rule of law in outer space, while the rule of law provided an effective institutional guarantee of international cooperation. The delegation expressing that view was also of the view that the Legal Subcommittee should play a leading role in that context, actively seeking workable cooperation mechanisms, as well as taking stock of them, to ensure the effective implementation of principles on international cooperation.

215. Some delegations expressed the view that international cooperation would continue to be a necessary basis for dealing with new challenges, such as ensuring the long-term sustainability of space activities and promoting peace and security so as to enable the sustainable development of all countries.

216. The Subcommittee agreed that the review of the mechanisms for cooperation in space activities would continue to assist States in understanding the different approaches to cooperation in space activities and would contribute to the further strengthening of international cooperation in the exploration and peaceful uses of outer space. In that regard, the Subcommittee reiterated that 2017, which, under its workplan was the final year of consideration of this agenda item, would be the fiftieth anniversary of the Outer Space Treaty.

XII. Proposals to the Committee on the Peaceful Uses of Outer Space for new items to be considered by the Legal Subcommittee at its fifty-fifth session

217. Pursuant to General Assembly resolution 69/85, the Subcommittee considered agenda item 13, entitled "Proposals to the Committee on the Peaceful Uses of Outer Space for new items to be considered by the Legal Subcommittee at its fifty-fifth session", as a regular item on the agenda. Under the item the Subcommittee also considered matters related to the organization of work.

218. The representatives of Algeria, Austria, Brazil, Canada, Chile, the Czech Republic, France, Germany, Indonesia, Italy, Japan, Mexico, Morocco, the Netherlands, the Republic of Korea, the Russian Federation, South Africa, Spain and the United States made statements under agenda item 13. During the general exchange of views, statements relating to the item were also made by representatives of other member States. The observers for ITU and SWF also made statements under the item.

219. The Subcommittee had before it the following:

(a) Working paper submitted by the Secretariat entitled "Review of the use of transcripts of the Committee on the Peaceful Uses of Outer Space and its Legal Subcommittee" (A/AC.105/C.2/L.282);

(b) Working paper submitted by Germany entitled "Proposal for a renewal of the structure of the agenda and the organization of work of the Legal Subcommittee" (A/AC.105/C.2/L.293/Rev.2);

(c) Note by the past, present and incoming Chairs of the Committee on the Peaceful Uses of Outer Space entitled "2018 'UNISPACE+50' theme of the Scientific and Technical Subcommittee, the Legal Subcommittee and the Committee on the Peaceful Uses of Outer Space" (A/AC.105/C.2/2015/CRP.10);

(d) Proposal by Germany for a single issue/item for discussion at the fifty-fifth session of the Legal Subcommittee: "Exchange of views on the concept of space traffic management" (A/AC.105/C.2/2015/CRP.13), supported by Austria, Luxembourg and the Netherlands;

(e) Proposal by Brazil for a single issue/item for discussion at the fifty-fifth session of the Legal Subcommittee: "Exchange of views on the application of international law to small satellite activities" (A/AC.105/C.2/2015/CRP.23);

(f) Proposal by the Group of Latin American and Caribbean States for a single issue/item for discussion at the fifty-fifth session of the Legal Subcommittee: "Exchange of views on the application of international law to small satellite activities" (A/AC.105/C.2/2015/CRP.23/Rev.1).

A. Proposals to the Committee on the Peaceful Uses of Outer Space for new items to be considered by the Legal Subcommittee at its fifty-fifth session

220. The Subcommittee agreed that the three single issues/items for discussion, entitled "Review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space", "General exchange of information and views on legal mechanisms relating to space debris mitigation measures, taking into account the work of the Scientific and Technical Subcommittee" and "General exchange of information on non-legally binding United Nations instruments on outer space", should be retained on the agenda of the Subcommittee at its fifty-fifth session.

221. The Subcommittee agreed that a new single issue/item for discussion entitled "General exchange of views on the legal aspects of space traffic management" should be included on the agenda of the Subcommittee at its fifty-fifth session, on the basis of conference room paper A/AC.105/C.2/2015/CRP.13.

222. The Subcommittee agreed that a new single issue/item for discussion entitled "General exchange of views on the application of international law to small satellite activities" should be included on the agenda of the Subcommittee at its fifty-fifth session, on the basis of conference room paper A/AC.105/C.2/2015/CRP.23/Rev.1, and that ITU should be invited to update the Subcommittee at its fifty-fifth session on relevant developments and issues regarding ITU procedures and regulations applicable to small satellites.

223. The Subcommittee agreed on the following items to be proposed to the Committee for inclusion in the agenda of the Subcommittee at its fifty-fifth session:

Regular items

1. Adoption of the agenda.
2. Election of the Chair.
3. Statement by the Chair.
4. General exchange of views.
5. Information on the activities of international intergovernmental and non-governmental organizations relating to space law.
6. Status and application of the five United Nations treaties on outer space.
7. Matters relating to:
   (a) The definition and delimitation of outer space;
   (b) The character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and

equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union.

8. National legislation relevant to the peaceful exploration and use of outer space.

9. Capacity-building in space law.

Single issues/items for discussion

10. Review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space.

11. General exchange of information and views on legal mechanisms relating to space debris mitigation measures, taking into account the work of the Scientific and Technical Subcommittee.

12. General exchange of information on non-legally binding United Nations instruments on outer space.

13. General exchange of views on the legal aspects of space traffic management.

14. General exchange of views on the application of international law to small satellite activities.

Items considered under workplans

15. Review of international mechanisms for cooperation in the peaceful exploration and use of outer space.

(Work for 2016 as reflected in the multi-year workplan in the report of the Legal Subcommittee on its fifty-first session (A/AC.105/1003, para. 179))

New items

16. Proposals to the Committee on the Peaceful Uses of Outer Space for new items to be considered by the Legal Subcommittee at its fifty-sixth session.

224. The Subcommittee agreed that IISL and ECSL should again be invited to organize a symposium, to be held during its fifty-fifth session, and noted that delegations wishing to propose topics for the symposium could do so directly to the organizers.

225. The Subcommittee noted that its fifty-fifth session had been tentatively scheduled to be held from 4 to 15 April 2016.

B. Organizational matters

226. The Subcommittee had before it the revised proposal by Germany for the renewal of the structure of the agenda and organization of work of the Legal Subcommittee, as contained in document A/AC.105/C.2/L.293/Rev.2.

227. Some delegations reiterated the view that the proposal by Germany constituted a timely and constructive effort to simplify the structure of the Subcommittee's agenda and to make more efficient use of the sessions of the Subcommittee.

228. Some delegations reiterated the view that, while the intention of the proposal by Germany was welcome, in particular on the restructuring of the schedule of work of the Subcommittee, some elements of the proposal needed further clarification and elaboration, including on the proposed new structure, with preparatory groups and working groups.

229. The view was expressed that the German delegation should further elaborate on the consensual aspects of the proposal, namely the restructuring of the agenda, and withdraw from the text the other aspects of the proposal, in particular those related to the role and organizational aspects of the working groups and their preparatory groups.

230. In the discussion under the agenda item, Germany was invited to continue carrying out open-ended consultations in the intersessional period in order to further elaborate on its proposal contained in A/AC.105/C.2/L.293/Rev.2, with a view to presenting to the Subcommittee a revised document taking into account comments by member States.

231. Some delegations expressed the view that there should be increased synergy and cooperation between the Scientific and Technical Subcommittee and the Legal Subcommittee, in order to further enhance consistency in the work of the Committee and its Subcommittees and to further the understanding and application of existing legal instruments relating to space law.

232. The view was expressed that the Committee should establish rules of procedure, as well as review its current practice of making decisions by consensus, and that the Secretariat should consult member States on the matter.

233. The Subcommittee considered the note by the past, present and incoming Chairs of the Committee on the Peaceful Uses of Outer Space entitled "2018 'UNISPACE+50' theme of the Scientific and Technical Subcommittee, the Legal Subcommittee and the Committee on the Peaceful Uses of Outer Space", contained in A/AC.105/C.2/2015/CRP.10.

234. The Subcommittee agreed to the main proposal put forward in that conference room paper and requested the Secretariat, in close consultation with the past, present and incoming Chairs of the Committee, to develop their proposal in further detail and to present it in the six official languages of the United Nations for consideration by the Committee at its fifty-eighth session, in June 2015, taking into account the recommendations made by the Scientific and Technical Subcommittee at its fifty-second session (A/AC.105/1088, annex I, para. 4).

235. In accordance with the decision made by the Legal Subcommittee in 2011 (A/AC.105/990, para. 198), and on the basis of the proposal made by the Secretariat to discontinue the use of unedited transcripts (see A/AC.105/C.2/L.282), the Subcommittee agreed to use digital recordings on a permanent basis, and agreed that the digital recording application should be further enhanced.

Annex I

Report of the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space

1. At its 897th meeting, on 13 April 2015, the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space reconvened its Working Group on the Status and Application of the Five United Nations Treaties on Outer Space under the chairmanship of Jean-François Mayence (Belgium).

2. The Working Group held four meetings, from 13 to 23 April 2015. At the opening meeting, the Chair recalled the mandate of the Working Group (see A/AC.105/942, annex I, paras. 4 and 6, and A/AC.105/990, annex I, para. 7). The Chair informed the Working Group that this was his last year in his capacity as its Chair.

3. The Chair also recalled that at its fifty-third session the Subcommittee had agreed to review, at its fifty-fourth session, the need to extend the mandate of the Working Group beyond the fifty-fourth session of the Subcommittee (see A/AC.105/1067, annex I, para. 15).

4. At the opening meeting, the Chair expressed his deep regret at the passing away of Vassilios Cassapoglou (Greece), who chaired the Working Group from 2006 to 2009, and paid tribute to his great dedication and contribution to the area of space law.

5. The Working Group had before it the following:

(a) Conference room paper on the status of international agreements relating to activities in outer space as at 1 January 2015 (A/AC.105/C.2/2015/CRP.8);

(b) Note by the Secretariat containing responses to the set of questions provided by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space, received from Germany (A/AC.105/C.2/2015/CRP.11) and Canada (A/AC.105/C.2/2015/CRP.21);

(c) Overview by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space of the responses from States members and permanent observers of the Committee to the set of questions provided by the Chair (A/AC.105/C.2/2015/CRP.12).

6. The Working Group also took note of the conference room paper containing answers from the Chair of the Space Law Committee of ILA to questions provided by the Chair of the Working Group (A/AC.105/C.2/2015/CRP.25).

7. The Working Group reviewed the responses to the set of questions provided by the Chair (see appendix), and a synthesis of views presented in writing and raised in the discussions of the Working Group during past sessions of the Legal Subcommittee, as contained in the overview by the Chair of the Working Group.

8. The Working Group noted that the set of questions continued to provide a good basis for discussion, within the mandate of the Working Group, on matters relevant to the status and application of the five United Nations treaties on outer

space. The Working Group also noted that the questions presented in the questionnaire were not exhaustive and should not serve to limit the discussion of the Working Group.

9. The Working Group noted that a comprehensive discussion had taken place at the current session with respect to issues concerning the relationship between the United Nations treaties on outer space, their implementation and application, and the nature of several fundamental principles laid down in those treaties.

10. Some delegations reiterated the view that the principles contained in the United Nations treaties on outer space remained a solid foundation and that the Working Group should take a practical rather than a theoretical approach in discussing the provisions of the treaties.

11. The Working Group noted that a number of views, either converging or diverging, had been expressed during the discussion on the questionnaire and in the responses received from States members of the Committee, either in written form or raised during the deliberations of the Working Group.

12. The Working Group recognized that it was useful to further explore such views under its current mandate, in particular those that might serve as elements of solutions, in order to ensure the rational implementation and full application of the provisions of the five United Nations treaties on outer space to current and future space activities.

13. The Working Group agreed that the outgoing Chair, together with the Secretariat, should present to the Working Group for consideration at its next session, in 2016, an updated overview of the responses to the set of questions, including a synthesis of views presented in writing and raised in the discussions during the meetings of the Working Group at the fifty-fourth session of the Legal Subcommittee, in 2015, as well as any other responses to the set of questions provided during the intersessional period, as a basis for future work of the Working Group and for promoting further discussions within the mandate of the Working Group.

14. The Working Group also noted that continued discussions would benefit from more written contributions from member States and international intergovernmental and non-governmental organizations having permanent observer status with the Committee, in order for the Working Group to gather a collection of views for future consideration.

15. The Working Group agreed that States members of the Committee and international intergovernmental and non-governmental organizations having permanent observer status with the Committee should again be invited to provide comments and responses to the questionnaire. Any replies received would be made available in a conference room paper.

16. The Working Group recommended that the Subcommittee, at its fifty-fifth session, in 2016, should reconvene the Working Group and review the need to extend the mandate of the Working Group beyond that session.

Appendix

Set of questions provided by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space

1. United Nations treaties on outer space and provisions related to the Moon and other celestial bodies

1.1 Do the provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) constitute a sufficient legal framework for the use and exploration of the Moon and other celestial bodies?

1.2 What are the benefits of being a party to the Moon Agreement?

1.3 Which principles or provisions of the Moon Agreement should be clarified or amended in order to allow for wider adherence to it by States?

2. International responsibility and liability

2.1 Could the notion of "fault", as featured in articles III and IV of the Convention on International Liability for Damage Caused by Space Objects (Liability Convention), be used for sanctioning non-compliance by a State with the resolutions related to space activities adopted by the General Assembly or its subsidiary bodies, such as Assembly resolution 47/68 on the Principles Relevant to the Use of Nuclear Power Sources in Outer Space, and the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space; in other words, could non-compliance with resolutions adopted by the General Assembly or with instruments adopted by its subsidiary bodies related to space activities be considered to constitute "fault" within the meaning of articles III and IV of the Liability Convention?

2.2 Could the notion of "damage", as featured in article I of the Liability Convention, be used to cover loss resulting from a manoeuvre, performed by an operational space object in order to avoid collision with a space object or space debris not complying with the Space Debris Mitigation Guidelines of the Committee?

2.3 Are there specific aspects related to the implementation of international responsibility, as provided for in article VI of the Outer Space Treaty, in connection with General Assembly resolution 41/65 on the Principles Relating to Remote Sensing of the Earth from Outer Space?

3. Registration of space objects

3.1 Is there a legal basis to be found in the existing international legal framework applicable to space activities and space objects, in particular the provisions of the Outer Space Treaty and of the Convention on Registration of Objects Launched into Outer Space (Registration Convention), which would allow the transfer of the registration of a space object from one State to another during its operation in orbit?

3.2 How could a transfer of activities or ownership involving a space object during its operation in orbit from a company of the State of registry to a company of a foreign State, be handled in compliance with the existing international legal framework applicable to space activities and space objects?

3.3 What jurisdiction and control are exercised, as provided for in article VIII of the Outer Space Treaty, over a space object registered by an international intergovernmental organization in accordance with the provisions of the Registration Convention?

4. International customary law in outer space

4. Are there any provisions of the five United Nations treaties on outer space that could be considered as forming part of international customary law and, if yes, which ones? Could you explain on what legal and/or factual elements your answer is based?

Annex II

Report of the Chair of the Working Group on the Definition and Delimitation of Outer Space

1. At its 897th meeting, on 13 April 2015, the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space reconvened its Working Group on the Definition and Delimitation of Outer Space under the chairmanship of José Monserrat Filho (Brazil).

2. The Chair drew the attention of the Working Group to the fact that, pursuant to General Assembly resolution 69/85, the Working Group had been convened to consider only matters relating to the definition and delimitation of outer space.

3. The Working Group had before it the following:

(a) Note by the Secretariat on questions on the definition and delimitation of outer space: replies from Member States (A/AC.105/889/Add.15 and 16);

(b) Note by the Secretariat on questions on suborbital flights for scientific missions and/or for human transportation (A/AC.105/1039/Add.4 and 5).

4. The Chair called on delegations to undertake practical and tangible steps that could lead to progress in the work of the Working Group, and stressed that such steps should facilitate a constructive discussion among delegations. The Chair recalled his proposal made at the fifty-third session of the Subcommittee, in 2014, to define the term "space activities" with the objective of building a consensus, even a preliminary one, while temporarily putting aside the task of defining and delimiting outer space in order to concentrate on the task of defining space activities, which was one of the areas to be regulated by space law.

5. Some delegations expressed the view that scientific and technological progress, the commercialization of outer space, the participation of the private sector, emerging legal questions and the increasing use of outer space in general had made it necessary for the Subcommittee to consider the question of the definition and delimitation of outer space.

6. Some delegations expressed the view that the definition and delimitation of outer space would help to bring about legal clarity in the application of air law and space law.

7. Some delegations expressed the view that there was no need to seek a legal definition or delimitation of outer space and that States should continue to operate under the current framework, which presented no practical difficulties, until such time as there was a demonstrated need and a practical basis for developing a definition or delimitation of outer space.

8. The view was expressed that continuing the discussion of the delimitation and definition under the present methodology might not lead to concrete solutions and that it would thus be preferable to consider, for example, other matters linked to the possible definition and delimitation of outer space.

9. Some delegations expressed the view that this matter was practical in nature and called for concrete solutions. The delegations expressing that view were also of the view that the work was not theoretical in nature.

10. The view was expressed that the Working Group could, as a possible way forward, consider matters relating to the compatibility of and interaction between air law and space law.

11. Some delegations were of the view that the delimitation of outer space was closely connected with the management of space activities and that the Working Group could first and foremost concentrate on relevant matters that needed a practical solution, such as suborbital flights or launches from flying objects.

12. Some delegations expressed the view that specific cases brought up by various actors conducting space activities could intensify the discussion in the Working Group.

13. Some delegations expressed the view that the Working Group and the Subcommittee should endeavour to foresee hazardous circumstances arising from aerospace activities and legislate them, as well as attempt to develop norms, bearing in mind various scenarios relating to the development of space technology and activities.

14. The view was expressed that it was important for the Working Group to concentrate on its mandate and to consider all possible solutions, and that one such solution could be to conclude that there would not be a need to define and/or to delimit outer space.

15. The view was expressed that, in order to progress in its work, the Working Group could continue to consider national legislation or any national practices that might exist or were being developed that related directly or indirectly to the definition and/or delimitation of outer space and airspace.

16. Some delegations expressed the view that it was necessary for the Subcommittee to address the issue of the definition and delimitation of outer space with a contribution in the form of technical expertise from the International Civil Aviation Organization (ICAO), which had also been addressing the matter.

17. On the basis of its discussions, the Working Group agreed:

(a) To continue to invite States members of the Committee to submit information on national legislation or any national practices that might exist or were being developed that related directly or indirectly to the definition and/or delimitation of outer space and airspace;

(b) To invite, through the Secretariat, States members and permanent observers of the Committee to submit concrete and detailed proposals regarding the need to define and delimit outer space, or justifying the absence of such a need, or to provide the Working Group with specific cases of a practical nature relating to the definition and delimitation of outer space and the safety of aerospace operations. Such structured, consistent and grounded contributions would be considered by the Working Group at its future meetings;

(c) To continue to invite States Members of the United Nations and permanent observers of the Committee to provide their replies to the following questions:

(i) Is there a relationship between suborbital flights for scientific missions and/or for human transportation and the definition and delimitation of outer space?

(ii) Will the legal definition of suborbital flights for scientific missions and/or for human transportation be practically useful for States and other actors with regard to space activities?

(iii) How could suborbital flights for scientific missions and/or for human transportation be defined?

(iv) Which legislation applies or could be applied to suborbital flights for scientific missions and/or for human transportation?

(v) How will the legal definition of suborbital flights for scientific missions and/or for human transportation impact the progressive development of space law?

(vi) Please propose other questions to be considered in the framework of the legal definition of suborbital flights for scientific missions and/or for human transportation.

Annex III

Report of the Chair of the Working Group on the Review of International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space

1. In accordance with General Assembly resolution 69/85, the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space reconvened its Working Group on the Review of International Mechanisms for Cooperation in the Peaceful Exploration and Use of Outer Space under the chairmanship of Setsuko Aoki (Japan).

2. The Working Group held five meetings between 17 and 23 April 2015. At the opening meeting, the Chair outlined the mandate of the Working Group under its multi-year workplan (A/AC.105/1003, para. 179).

3. The Working Group had before it the following:

(a) Note by the Secretariat on the review of international mechanisms for cooperation in the peaceful exploration and use of outer space, containing information received from Japan and Spain (A/AC.105/C.2/107);

(b) Conference room paper on the review of international mechanisms for cooperation in the peaceful exploration and use of outer space, containing information received from Austria (A/AC.105/C.2/2015/CRP.14);

(c) Conference room paper on the categorization of international mechanisms for cooperation in the peaceful exploration and use of outer space (A/AC.105/C.2/2015/CRP.15).

4. The Working Group also took into account in its deliberations the documents made available at the fifty-second and fifty-third sessions of the Subcommittee and presentations made under the present agenda item.

5. The Working Group recalled that the conclusion of its work under the five-year workplan, in 2017, would coincide with the fiftieth anniversary of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and that the result of that work could serve as an important contribution to that commemoration, as international mechanisms for cooperation had evolved considerably over the past 50 years. In that regard, the Working Group noted that its work could provide a significant contribution to the 2018 "UNISPACE+50" thematic cycle of the Committee on the Peaceful Uses of Outer Space and its Scientific and Technical Subcommittee and Legal Subcommittee.

6. The Working Group recalled that categorizing mechanisms for international cooperation would lead to a better understanding of the different approaches to cooperation in space activities taken by States and international organizations and that the findings would assist the Working Group in identifying the types of mechanisms being used and their content. An analysis of the findings would allow the Working Group to consider how its work could contribute to the further strengthening of international cooperation in the peaceful exploration and use of outer space.

7. In that regard, the Working Group noted with satisfaction conference room paper A/AC.105/C.2/2015/CRP.15, which had been prepared by the Secretariat, in close consultation with the Chair of the Working Group on the basis of contributions made by States members and permanent observers of the Committee to the work of the Working Group and of additional research. The Working Group agreed that the document constituted a sound basis on which to further develop its work.

8. In the course of the work of the Working Group during the present session of the Subcommittee, several examples of international mechanisms for cooperation were observed, ranging from the use of bilateral and multilateral agreements and memorandums of understanding to the use of regional and interregional cooperation and coordination mechanisms and other international cooperation mechanisms for specific space activities. States members of the Committee presented the lessons learned about international cooperative mechanisms, in the form of case studies, reflecting on the reasons for selecting certain cooperative mechanisms for certain cooperative objectives. The Chair of the Working Group and the Secretariat were requested to continue analysing contributions made to the work of the Working Group and to the consideration of the present agenda item of the Subcommittee, with a view to further developing the content of conference room paper A/AC.105/C.2/2015/CRP.15.

9. The Working Group agreed to the following:

(a) States members of the Committee on the Peaceful Uses of Outer Space and international intergovernmental and non-governmental organizations having permanent observer status with the Committee should again be invited by the Secretariat to provide examples and information on the mechanisms for international cooperation they utilized for space cooperation, in order to develop an understanding of the range of collaborative mechanisms employed by States and international organizations and the circumstances in which certain classes of mechanisms were favoured by States over other mechanisms;

(b) States members and permanent observers of the Committee were encouraged to include in their responses examples of case studies and lessons learned, as appropriate, so that the Working Group could get an understanding of why certain cooperative mechanisms were selected for certain types of international cooperation, how the choice was made between legally binding and non-legally binding mechanisms and between formal and informal arrangements, and why, for example, bilateral agreements for space cooperation were structured as they were;

(c) States members and permanent observers of the Committee might again refer to the set of questions contained in the report of the Chair of the Working Group included in the report on the fifty-third session of the Legal Subcommittee (A/AC.105/1067, annex III, para. 10).

10. On the basis of responses provided by States members and permanent observers of the Committee, the Secretariat, in close consultation with the Chair of the Working Group, was requested to update conference room paper A/AC.105/C.2/2015/CRP.15, including by adding a new chapter on lessons learned, and to make available a revised version of that conference room paper for consideration and further guidance by the Working Group at the fifty-fifth session of the Subcommittee, to be held in 2016.

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Committee on the Peaceful Uses of Outer Space

Space for global health

Special report of the Inter-Agency Meeting on Outer Space Activities on the use of space science and technology within the United Nations system for global health

I. Introduction

1. The General Assembly, in its resolution 69/85, on international cooperation in the peaceful uses of outer space, urged the Inter-Agency Meeting on Outer Space Activities (UN-Space), under the leadership of the Office for Outer Space Affairs of the Secretariat, to continue to examine how space science and technology and their applications could contribute to implementing the Millennium Declaration and to the post-2015 development agenda process, and encouraged entities of the United Nations system to participate, as appropriate, in UN-Space coordination efforts to that effect.

2. UN-Space serves as the focal point for inter-agency coordination and cooperation in space-related activities within the United Nations system. At its thirty-fourth session, held in New York on 13 and 14 May 2014, UN-Space recalled that its previous special reports had addressed the following themes (A/AC.105/1064, para. 17): new and emerging technologies, applications and initiatives for space-related inter-agency cooperation (see A/AC.105/843); space benefits for Africa: contribution of the United Nations system (see A/AC.105/941); use of space technology within the United Nations system to address climate change issues (see A/AC.105/991); and space for agriculture development and food security (see A/AC.105/1042).

3. At its thirty-fourth session, UN-Space agreed that the next special report should address the theme of space for global health (A/AC.105/1064, para. 18).

4. The present report was prepared by the Office for Outer Space Affairs in cooperation with the World Health Organization (WHO), the Cartographic Section of the Department of Field Support of the Secretariat and the secretariat of the United Nations Framework Convention on Climate Change.

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II. Selected areas in which United Nations entities focus on the use of space science and technology for public health

5. Each year, non-communicable and communicable diseases and maternal, neonatal and nutrition-related conditions together cause an estimated 50 million deaths worldwide. Innovative approaches to solve health problems are needed to complement traditional good practices in the health sector. Such approaches include the use of space science and technology for health promotion, health protection, surveillance, health-care delivery in remote areas using telemedicine and tele-health services. Space science and technology provide innovative research platforms for advancing medical knowledge and spin-offs for the development of health-care equipment, operational activities and procedures. Space-based data and technologies foster connectivity in health emergencies, and the integration of space-derived information in health-care systems supports the mapping of populations, the treatment of diseases, the distribution of medication, transportation systems and water supply and sanitation and facilitates the monitoring of trends in air quality and health-related environmental factors.

6. With three of the eight Millennium Development Goals focusing specifically on health, the health sector has led the development success of the era of the Millennium Development Goals and set the stage for the achievement of even more after 2015. Health is also at the core of the sustainable development goals proposed by the Open Working Group of the General Assembly on Sustainable Development Goals in its report (A/68/970 and Corr.1). In its resolution 68/309, the Assembly decided that the proposal of the Open Working Group contained in the report should be the main basis for integrating the sustainable development goals into the post-2015 development agenda. The contribution of space science and technology to health is also fully in line with the WHO leadership priorities set out in the twelfth general programme of work of WHO, covering the period 2014-2019.

7. Space science and technology provide important tools that can support public health stakeholders in planning, research, prevention, early warning, alerts and health-care delivery. Information derived from Earth observation and meteorological satellites in combination with geographic information and global navigation satellite technologies has increasingly been used to study disease epidemiology, enabling increased use of spatial analysis to identify the ecological, environmental, climatic and other factors that can have a negative effect on public health or can contribute to the spread of certain diseases. United Nations entities assist developing countries in making use of space-based solutions to fight the spread of these diseases.

8. Satellite communications are essential for tele-health and for the management of epidemics in cases involving natural or human-made disasters. Early warning and disaster preparedness rely on data collected by satellites and validated by fieldwork. Such data products, when incorporated in a geographical database, could be used to develop spatial models for predicting high-risk areas. Space stations and their Earth-bound analogues serve as platforms for health studies. Efforts are also being made to promote international cooperation in the peaceful uses of outer space for economic, social and scientific development, in particular for the benefit of developing countries. Priorities include building indigenous capability in space policy, science and technology in the area of global health.

A. Forging international cooperation in the peaceful uses of outer space for health

9. The Action Team on Public Health (action team 6) was officially created in 2001 to follow up on the implementation of recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), held in Vienna from 19 to 30 July 1999. The Action Team's mission was to foster the implementation of tele-health for developing countries and improve public health services by facilitating the application of space technologies for early warning of infectious diseases.

10. In pursuing its mandate, the Action Team addressed the following issues proposed by the Office for Outer Space Affairs:

(a) Facilitating the development of national policies for utilizing broadband services and data in developing countries in order to support health surveillance and data acquisition for that purpose;

(b) Applying space-based data to develop an early warning mechanism capable of predicting public health threats and alerting authorities in a timely manner;

(c) Facilitating the provision of or access to capacity-building and training in the field of tele-epidemiology.

11. The Action Team completed a three-year consultation on the topic of tele-health and tele-epidemiology in 2010. The final report of the Action Team, on the use of space applications to improve public health (A/AC.105/C.1/L.305), was presented to the Scientific and Technical Subcommittee at its forty-eighth session, in 2011. In that report, it was noted that space technology played a significant role in supporting operational needs specific to public health practice, including areas such as early warning systems for infectious diseases, health surveillance programmes and emergency preparedness and field response. Reference was made to the numerous initiatives, programmes and activities at the global, regional and national levels and to the fact that the time had come for fostering more synergy and creating new integrated platforms to promote the convergence of common interests and needs. It was noted that the international community should benefit from those initiatives and the sharing of lessons learned in existing forums.

12. The Office for Outer Space Affairs continued its support of the Action Team's follow-up initiative for an open community approach to tele-health and telemedicine by collaborating with the University of Koblenz-Landau in Germany and the National Institute of Health of El Salvador in organizing in October 2013 an international teleconference on improving public health through low-cost technology and GPS-tailored access to risk assessment and resources, connecting experts from Austria, Canada, El Salvador, Germany, India, South Africa and Sri Lanka.

13. Recognizing the effective role of space science and technology and their applications for tele-health and tele-epidemiology, the Committee on the Peaceful Uses of Outer Space at its fifty-seventh session, in 2014, endorsed the recommendation of the Scientific and Technical Subcommittee at its fifty-first session to establish an expert group on space and global health to consider

issues related to the use of space technology for public health (A/AC.105/1065, annex I, para. 6).[1] The expert group, under the leadership of Canada, held a meeting during the fifty-second session of the Subcommittee, in 2015, and presented its method and programme of work, including a concrete timeline for its multi-year work. The expert group will, among other things, review the current and evolving state of affairs relative to the use of space technology applications in support of global health, compile practices and initiatives in that field, analyse gaps and opportunities for future development and explore possible cooperative and user-driven solutions to address those gaps (A/AC.105/1088, annex I, paras. 5-7).

B. Engaging space-based tools for public health and health-care delivery

Tele-epidemiology

14. In the area of health protection, space technology is well suited to the dynamic nature of outbreaks and epidemics of infectious diseases. Tele-epidemiology is employed by United Nations entities in cooperation with a diverse community of partners to provide information and develop models to support outbreak awareness, preparedness, response and control strategies.

15. Tele-epidemiology combines the use of information from satellite-based platforms to investigate and forecast outbreaks and the re-emergence of infectious diseases. The use of remote sensing has significantly advanced the possibility to track and visualize the real-time evolution of local outbreaks and epidemics and map the environmental influences for the epidemics and critical public health infrastructure. Space-derived information is used in tele-epidemiology in programmes for specific diseases, such as yellow fever, cholera and leptospirosis, to develop a decision-support tool and to provide information for current vaccination strategies. Applications of tele-epidemiology by United Nations entities for specific situations or diseases are discussed in the sections below.

16. The Office for Outer Space Affairs, through the United Nations Programme on Space Applications, has organized activities to improve capacities of Member States in tele-epidemiology. These include, for example, the United Nations/India/European Space Agency Regional Workshop on the Use of Space Technology in Tele-epidemiology to Benefit Asia and the Pacific, held in Lucknow, India, in October 2008.

17. Through the United Nations Programme on Space Applications, the Office for Outer Space Affairs also provided advisory assistance and financial support to the National Commission on Space Activities (CONAE) of Argentina for the organization of the Third Advanced School for Training in Landscape Epidemiology, held at the Mario Gulich Institute for Advanced Space Studies in Córdoba, Argentina, from 27 May to 7 June 2013. The training programme was organized to assist national space agencies and research and academic institutions from developing countries in the region in enhancing the use of space tools in landscape epidemiology (A/AC.105/1062, para. 40).

[1] A/69/20, para. 99.

18. WHO, as part of the International Health Regulations programme, is working with external partners to create yellow fever risk maps for the development of international travel and health guidelines, as well as supporting preparedness. Risk-mapping activity serves the purposes of minimizing the adverse effects of vaccine on travellers and preventing the spread of the disease. The maps utilize remote sensing and satellite imagery to incorporate factors such as elevation and vegetation in order to identify and demarcate areas and populations at risk (A/AC.105/961, para. 56).

19. *Protocol for Assessing National Surveillance and Response Capacities for the International Health Regulations (2005) in Accordance with Annex 1 of the IHR: A Guide for Assessment Teams*, published by WHO in December 2010, includes an item on geographic information systems (GIS). The Global Alert and Response Team manages an integrated global alert and response system for epidemics and other public health emergencies based on strong national public health systems and capacity and an effective international system for coordinated response. Using GIS in combination with space-based information as part of its response to the recent Ebola crisis is one example of how it presents surveillance information on maps using the web.[2]

20. As part of its programme for the immunization of preventable disease, the WHO Regional Office for South-East Asia has recently invested in the development of GIS-based tools and a system to promote the use of data (i.e. the collection, analysis, interpretation and review of data, including data from satellite remote sensing) in decision-making, in order to strengthen the capacity of governments and the field network of the immunization programme in the analysis and management of vaccine-preventable diseases and routine immunization data, to strengthen the surveillance of such diseases and to support the achievement of the goals of the immunization programme. The GIS-based tool, designed by the WHO Country Office in Nepal, will assist districts in planning surveillance and immunization activities.[3] The Myanmar Information Management Unit, under the direction of the Resident and Humanitarian Coordinator, contributed to the training of data assistants on the use of basic GIS techniques.

E-health

21. E-health is a generic term used to refer to all digital health-related information. Telemedicine and teleconsultations, electronic health records and hospital and health information systems, e-prescriptions and computer-assisted imaging are examples of modalities in e-health. In its resolution 58.28, the World Health Assembly stressed that e-health was "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research".

22. WHO and the International Telecommunication Union (ITU), recognizing the importance of collaboration, have developed the National eHealth Strategy Toolkit, which encourages countries to develop national e-health strategies. The toolkit is a resource for developing or revitalizing a country's e-health strategy through the

[2] See www.who.int/csr/disease/ebola/maps/en/.

[3] See www.searo.who.int/nepal/documents/Nep_IPD_GIS/en/.

development of a national e-health vision and implementation road map, as well as a plan to monitor implementation and manage associated risks.

23. In addition, e-health issues have been the focus of a number of ITU study groups. These include ITU-D Study Group 2, Question 14 (Telecommunications for e-health); ITU-T Study Group 16, Question 28 (Multimedia framework for e-health applications); ITU-T Study Group 17, Question 9 (Telebiometrics); and the ITU-T Focus Group on Machine-to-Machine Service Layer.

Tele-health and telemedicine

24. Tele-health and telemedicine applications embrace computer and telecommunications technologies, including satellite communications, to bring medical experts into virtual contact with patients or doctors in remote and rural areas, thus avoiding costly relocation to hospitals in urban areas, which could prove detrimental to the patients' health.

25. Some recent activities organized by the Office for Outer Space Affairs in cooperation with Member States, specialized agencies and intergovernmental organizations in the area of applying space technologies to global health include the United Nations/Burkina Faso/World Health Organization/European Space Agency/Centre national d'études spatiales Workshop on the Use of Space Technology in Tele-health to Benefit Africa, held in Ouagadougou in May 2008 (see A/AC.105/915), the Workshop on Applications of Tele-health to Service Delivery in Public Health and Environment, held in Thimphu in July 2009 (A/AC.105/969, para. 25), the United Nations/Islamic Republic of Iran Regional Workshop on the Use of Space Technology for Human Health Improvement, held in Tehran in October 2011 (see A/AC.105/1021), and the International Expert Meeting on the theme "Improving public health through space technology applications: an open community approach", held in Bonn, Germany, from 30 July to 1 August 2012.

26. Several other activities or developments have taken place in the area of telemedicine, including continued collaboration between the WHO Regional Office for Europe and the European Space Agency (ESA) in the Telemedicine Alliance consortium under the auspices of the Information Society and Media Directorate-General of the European Commission; the publication of the ESA Telemedicine via Satellite Programme; and the setting up of a task force on telemedicine in sub-Saharan Africa, composed of African regional organizations, WHO, the European Commission and ESA (A/AC.105/886, para. 64).

27. The Pan-African eNetwork project is a joint initiative of the African Union and the Government of India to provide the States members of the African Union with information and communication technology services and content in the areas of telemedicine, tele-education and connectivity among the seats of government. The first phase of the project was inaugurated in 2009 in 11 countries: Benin, Burkina Faso, Gabon, Gambia, Ghana, Ethiopia, Mauritius, Nigeria, Rwanda, Senegal and Seychelles. The second phase of the project was launched in 2010. Of the 47 countries that have joined the project, 34 have received coverage; coverage in the remaining countries is to be completed towards the end of 2015.

28. The basic objective of the Pan-African eNetwork project is to assist Africa in capacity-building by imparting education to 10,000 students in Africa over a five-year period in various disciplines, using some of the best universities and

educational institutions in India. Through the project, Indian medical specialists in various areas selected by the African Union for its member States provide telemedicine services by way of online medical consultation to medical practitioners at locations in Africa.

29. Regular telemedicine and tele-education services have already been started on the Pan-African eNetwork. Telemedicine consultations are being provided from specialized hospitals in India to African countries on request. Moreover, since April 2009, 11 specialized hospitals in India have conducted 654 continued medical education sessions using the network.

C. Forecasting health risks from climate change, including extreme weather events and changes in natural environment

Climate and public health

30. According to the fifth assessment report of the Intergovernmental Panel on Climate Change, climate change is affecting health both directly, as a result of changes in temperature and precipitation and the occurrence of heatwaves, floods, droughts and fires, and indirectly, as a result of ecological disruptions brought on by climate change, such as crop failures and shifting patterns of disease vectors, or social responses to climate change, such as the displacement of populations following prolonged drought. Space-based technologies can thus contribute to the assessment of the direct effects of climate and weather on health, as well as ecosystem-mediated effects of climate change on health outcomes.

31. Space-based technologies can also be used to support operational work in the public health sector, such as mapping of the geographical distribution of meteorological events posing risks to public health and critical public health infrastructure. For example, the Vulnerability and Risk Analysis and Mapping programme of WHO uses remotely sensed and other environmental information and combines it with disaggregated vulnerability and capacity indicators to identify population and health services at risk of hazards such as floods, droughts and heatwaves and to enhance efforts to reduce disaster risk. Such technologies also have a potential to map other climate-related issues such as heatwaves and help discriminate between the effects of sudden extreme weather events and longer-term and slow-onset climate effects.

32. A workshop entitled "Enhancing Observations to Support Preparedness and Adaptation in a Changing Climate: Learning from the IPCC Fifth Assessment Report" was held in Bonn, Germany, from 10 to 12 February 2015. At the workshop, which was organized jointly by the Global Climate Observing System, the secretariat of the United Nations Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change, climate data needs were identified in key sectors, one of which was health. It was noted that the health organizations regularly used short-term weather forecasts especially for heat-health warnings as well as sand and dust warnings and advisories; however, their use of seasonal-to-decadal information was limited, seasonal data only being used by some organizations to anticipate requirements of health systems. Further development could help fill those gaps.

Meningitis

33. Meningococcal meningitis is a devastating epidemic disease in Africa, affecting the lives of individuals and communities in the "meningitis belt" of Africa, a sub-Saharan zone extending from Senegal to Ethiopia. *Neisseria meningitides*, the causal agent for the bacterial disease, is transmitted through respiratory droplets throughout the year, but the climate, notably hot, dry and dusty conditions, irritating the throat, appears to be favourable for invasive disease and associated epidemics. Furthermore, the timing of the epidemic year and the spatial distribution of disease cases throughout the "meningitis belt" strongly indicate a close linkage between the life cycle of the causative agent and climate variability.

34. Integrating the environmental knowledge in decision-support tools can assist health officials in predicting epidemics and devising vaccination strategies, and remote-sensing technology plays a key role in providing information on absolute humidity, absorbing aerosols, rainfall and land cover and other environmental influences relating to the epidemics.

35. The Meningitis Environmental Risk Information Technologies (MERIT) project, a collaborative initiative of WHO and other international organizations, research institutes and members of the environmental, public health and epidemiological communities, is aimed at facilitating the use of environmental information in public health decision-making. The project has helped to improve the understanding of the relationship between epidemics and environmental parameters, and of the requirements of the public health community, and serves as an example of amalgamating the use of Earth observations in policy formulation in the health sector.

36. A number of research projects within the MERIT framework are engaging national, regional and international institutions, including the World Meteorological Organization, national meteorological services, the African Centre for Meteorological Applications for Development, the Goddard Institute for Space Studies and the Jet Propulsion Laboratory of the National Aeronautical and Space Administration of the United States of America and the National Oceanic and Atmospheric Administration of the United States, to increase the use of relevant satellite-derived information and tools in these efforts.

D. Monitoring air quality

Air pollution

37. Air pollution has become one of the leading risks to global health. There is convincing evidence linking the risk of disease (and premature death) with exposure to fine particulate matter, even at relatively low concentrations of the pollutants. The most recent WHO and external scientific assessments have estimated that between 6 million and 7 million premature deaths could be attributed to air pollution exposure, including about 3.7 million premature deaths from ambient outdoor air pollution and another 4.3 million premature deaths from indoor air

pollution;[4] the premature deaths from indoor air pollution are largely attributable to the combustion of solid fuels in primitive stoves used by the world's poor.[5,6]

38. Exposure to particulate air pollution — and the burden of disease — can be estimated using surface monitoring stations. The urban air pollution exposure database of the WHO Global Health Observatory already includes such data on over 1,500 cities throughout the world.[7] However, many parts of the developing world, including urban and rural areas, are not included. As a result, scientists have been working to devise methods to combine surface monitoring data with data from satellite remote sensing and atmospheric transport models.

39. To advance the use of air pollution disease burden estimates, WHO has begun the development of a global platform on air quality and health, building on its existing urban air pollution database, as well as available satellite remote sensing and atmospheric transport model data from leading national and scientific institutions throughout the world. Augmenting ground-based measurements and model estimates with remote-sensing data makes it possible to increase the availability of global information on key air pollutants, especially for the most highly polluted and data-poor regions.

40. Regular updates of improved estimates, involving data from satellite remote sensing, have been provided by WHO since the beginning of 2014. Further refinements in remote-sensing methodologies, allowing for more precise retrieval of high-resolution data, can contribute to even more precise assessments of pollution sources, as well as of pollution hotspots and health impacts among particularly vulnerable populations. This creates an opportunity for better global, regional and local assessment of the burden of disease resulting from pollution, as well as the identification of key pollution sources, supporting relevant policies by providing reliable information (A/AC.105/1063, para. 38).

Mercury observations

41. Mercury is recognized as a substance producing significant adverse neurological and other health effects, with particular concerns expressed about its harmful effects on unborn children and infants. To protect human health and the environment from the adverse effects of mercury, the Minamata Convention on Mercury, a global treaty named after a city in Japan where serious health damage occurred in the middle of the twentieth century as a result of mercury pollution, was formally adopted and opened for signature in October 2013 under the leadership of the United Nations Environment Programme (UNEP).

42. Mercury, which occurs naturally, has broad uses in everyday objects and is released to the atmosphere, soil and water from a variety of sources. Controlling the

[4] There is some overlap between indoor and outdoor air pollution exposures and mortality, meaning that the total sum of mortality from all air pollution sources may be less than the sum of the mortality attributable to ambient and indoor air pollution exposures.

[5] See www.who.int/phe/health_topics/outdoorair/en/.

[6] Stephen S. Lim and others, "A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010", *The Lancet*, vol. 380, No. 9859 (15 December 2012), pp. 2224-2260.

[7] See www.who.int/gho/phe/outdoor_air_pollution/exposure/en/.

anthropogenic releases of mercury throughout its life cycle has been a key factor in shaping the obligations under the Minamata Convention. In this regard, space technology has proved to be useful in providing timely and reliable information on a global scale for understanding major processes and mechanisms affecting the dynamics of mercury in the atmosphere and at interfaces with other ecosystems.

43. Remote-sensing technology makes it possible to obtain information on patterns of mercury concentration, deposition, dispersion, meteorological conditions and atmospheric transport and effectively complements ground-based observations in shaping the scientific basis for setting and implementing strategies on mercury and for evaluating current and future levels of mercury pollution.

44. UNEP (through its Global Mercury Partnership), the Economic Commission for Europe, the secretariat of the Convention on Long-range Transboundary Air Pollution and the Group on Earth Observations are the key international entities involved in fostering partnerships, providing technical assistance and capacity-building activities for the development and support of global mercury observations.

E. Controlling water quality

Water quality and availability

45. Inadequate water, sanitation and hygiene continue to pose a major threat to human health. Water quality is continuously monitored to control water characteristics, identify trends over time, identify emerging problems, determine whether pollution control programmes are working, help design pollution control efforts and respond to emergencies such as floods and spills.

46. Traditional monitoring of water quality involves on-site sampling of water and subsequent laboratorial analyses. While this provides accurate measurements, it is normally costly, time-consuming and indicative only of the situation at the particular points where the samples were obtained. Wider coverage of water quality observations can be obtained by satellite-based remote-sensing technology, which is suitable for near-real-time geographical coverage of water quality of inland freshwater systems, such as lakes, reservoirs, rivers and dams, and which is capable of detecting lake eutrophication, light penetration, phytoplankton bloom, chlorophyll levels, turbidity and other parameters.

47. The Health Mapping Project is an initiative of the WHO Collaborating Centre for Health Promoting Water Management and Risk Communication, located at the Institute for Hygiene and Public Health at the University of Bonn, Germany. It focuses on the mapping of diseases on an online geographic information system (web-GIS), in particular waterborne diseases, by integrating data from different WHO databases, including remotely sensed data. Further mapping features include access to water and waste-water infrastructure and visualization of the ratification status of the Protocol on Water and Health to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (A/AC.105/910, para. 34).

48. As another example, the Economic and Social Commission for Western Asia is coordinating the implementation of the Regional Initiative for the Assessment of the

Impact of Climate Change on Water Resources and socioeconomic vulnerability in the Arab region. This initiative generates geospatial information and analysis based on regional climate model downscaling, hydrological modelling and an integrated vulnerability assessment, which draw upon geospatial databases, satellite images, remote sensing and local observations. In particular, the regional hydrological modelling component incorporates climatic observations, elevation data, land parameters, and hydrological data on surface water and groundwater and makes it possible to enhance the understanding of potential changes in water resources in the region.

Monitoring recreational waters

49. Lakes, rivers and seas are used for a variety of recreational activities, including swimming, diving, fishing and sailing. If these activities are to be enjoyed safely, attention must be given to health hazards such as water pollution or excessive growth of toxic cyanobacteria. Space technology, through its Earth observation applications, provides vital information for assessments and monitoring programmes for bodies of water used for recreation.

50. Cyanobacteria can be found in almost every water reservoir on Earth. Aquatic cyanobacteria are known for their extensive and highly visible blooms, which can be toxic. Detection of the blooms can lead to the closure of recreational inland water systems and some coastal waters, because of contamination of the water by toxic strains of cyanobacteria and the identification of cases of human or animal poisoning. While cyanobacteria generally have fairly slow growth rates compared with many other microorganisms, they have the ability to change their concentration and position in a body of water within a very short time span.

51. Satellite-based Earth observation provides techniques that can be used for deriving near-real-time information on the state of the cyanobacterial population and toxins. Remote sensing of the optical properties of a body of water using high-resolution airborne scanners makes it possible to obtain instant information on the distribution and levels of chlorophyll and the potential presence of cyanobacterial phycobiliprotein pigments in fresh water. For vast recreational areas this technology may prove cost-effective.

52. WHO, the United Nations Educational, Scientific and Cultural Organization, UNEP and the World Meteorological Organization have cooperated closely in the development of guidelines for recreational uses of water areas. These guidelines are aimed at supporting the development of national and international policies concerning water and health and assisting countries in developing capacities to establish and maintain healthy water environments.

F. Tracking vector-borne diseases*

Biodiversity dynamics as an affecting factor for transmission of vector-borne diseases

53. Earth observation data and field data are being increasingly integrated into disease models to map and predict changes in habitats and biodiversity and calculate risks to public health. Land-use dynamics, animal reservoir mapping, the state of forest cover and water reservoirs are key determinants for the plague, Lyme disease and other vector-borne diseases. The models help environmental decision makers and public health practitioners to better understand the effectiveness of intervention measures, such as repellents, integrated pest management, land-use practices and disease treatment.

54. Lyme disease (Lyme borreliosis) is an infectious disease caused by bacteria belonging to the genus *Borrelia*, transmitted though tick bites. Ticks acquire it by feeding on infected hosts, mostly rodents. The rates of tick and human infection are generally influenced by relative populations of host mammals, which, in turn, are affected by changes in land use and the degree of forest connectivity. The Group on Earth Observations has been collaborating with others to develop a Lyme disease model and a web-based decision-support tool for risk-appropriate tick-bite protection and disease prevention.

55. Efforts are also being made to use satellite imagery to improve the surveillance and control of the plague in several countries in Central Asia where it is endemic, where the gerbil is the main animal reservoir of the disease and where movements of human populations into previously uninhabited areas are increasing the risk of human cases. In collaboration with the Centre national d'études spatiales of France and several research institutes, WHO has been involved in a pilot project in Kazakhstan to develop the use of satellite imagery for improving the monitoring of the animal reservoir, the detection of epizootic diseases, the prediction of epidemics and the development of a software tool for data management, mapping and integration of satellite images (A/AC.105/961, para. 56).

56. In 2015, the new thematic priority of monitoring and protecting biodiversity and ecosystems was included in the United Nations Programme on Space Applications. Under this thematic priority, the Office for Outer Space Affairs will organize the United Nations/Kenya Workshop on Space Technology and Applications for Wildlife Management and Protecting Biodiversity, to be held in Kenya in November 2015.

Malaria

57. Malaria is a life-threatening but preventable and curable disease caused by parasites transmitted through the bites of infected mosquitoes. The disease is widespread in tropical and subtropical regions that are present in a broad band around the equator. An estimated 3.4 billion[8] people continue to be at risk of malaria, mostly in Africa and South-East Asia. In 2012, an estimated 627,000 people

* This section includes examples of selected vector-borne diseases, and the list is not exhaustive.

[8] See www.who.int/mediacentre/news/releases/2013/world-malaria-report-20131211/en/.

died of malaria. Most deaths occur among children living in Africa, where every minute a child dies from malaria.

58. While human immunity is an important factor, transmission also depends on climatic conditions that may affect the number and survival of mosquitoes. These include rainfall patterns, temperature and humidity. Environmental factors include elevation, vegetation, land-cover type, vector density, proximity to bodies of water, kind of water (running or stagnant) and others. Remote-sensing satellites can effectively provide observations for these factors, which could be integrated into decision-support tools to predict future outbreaks of malaria and assist in devising interventions for malaria vector control in endemic countries.

59. For optimal utilization of limited resources for malaria control interventions, satellite-sensed data needs to be supported by ground-based observations. Data collected on the ground include vector species abundance, infectivity, insecticide resistance status and parasite prevalence in the population. To address broader gaps in the implementation of policies for malaria vector control, in particular technical guidance for malaria vector control programmes, the Technical Expert Group on Malaria Vector Control was established by the WHO Global Malaria Programme on the recommendation of the Malaria Policy Advisory Committee in September 2012.

60. A malaria information system was developed in one of the projects of the Institute for Hygiene and Public Health at the University of Bonn, Germany. The Institute established the Medical Geography and Public Health Workgroup, which considers medical geography as the scientific interface between the fields of geography and medicine. It applies geographical concepts, techniques and methods to medical issues and problems, focusing on the analysis of population-specific health and illness aspects. The primary areas of research include spatial-temporal analysis of the appearance of infectious diseases; water supply structures; data gathering and analysis; water safety plans; microbial water contamination; hygiene-geoecological risk analysis, health and disease mapping; geographic infection epidemiology; nature conservation and health protection; and sport and event hygiene. Satellite-based remote-sensing data play an important role in this research.

61. The malaria experiment is one of the protein crystal growth experiments conducted on the International Space Station (ISS). Protein crystallization experiments were performed on an enzyme of the malaria parasite *Plasmodium falciparum*. Due to the microgravity environment of ISS, protein molecules are aligned in an orderly manner, creating a high-quality crystal that enables the structural analysis of the protein and enhances the understanding of biological structure-function relationships. If structural analysis of the enzyme or enzyme pharmacon complex is possible, there will be a good chance of developing a pharmaceutical preparation for the effective treatment of malaria.

Rift Valley fever

62. Rift Valley fever is a viral zoonosis that primarily affects animals but also has the capacity to infect humans. Infection can cause severe disease in both animals and humans. It can also lead to considerable economic losses because of the decline in livestock. The vast majority of human infections result from direct or indirect

contact with the blood or organs of infected animals. The virus can be transmitted to humans by infected mosquitoes and blood-feeding flies.

63. Among animals, the Rift Valley fever virus is spread primarily by the bite of infected mosquitoes, mainly mosquitoes of the genus *Aedes*. The female mosquito is also capable of transmitting the virus directly to its offspring, as new generations of infected mosquitoes can hatch from eggs. This provides the virus with a sustainable mechanism for continuing its existence, as the eggs of these mosquitoes can survive for several years in dry conditions. During periods of heavy rainfall, larval habitats frequently become flooded, enabling the eggs to hatch and the mosquito population to rapidly increase, spreading the virus to the animals on which the mosquitoes feed.

64. In African countries, as well as in Saudi Arabia and Yemen, Rift Valley fever outbreaks are closely associated with periods of above average rainfall. In addition, outbreaks in East Africa are closely associated with the heavy rainfall that occurs during the warm phase of the El Niño-Southern Oscillation phenomenon, when anomalously warm sea surface temperatures cause climatic changes throughout the tropics and subtropics. In this regard, climate-based forecasting has proved to be an important means of controlling the disease. The sea surface temperature, rainfall level and response of vegetation to increased levels of rainfall can be easily measured and monitored by remote-sensing satellite imagery.

65. To enhance early warning systems for Rift Valley fever and avert impending epidemics, the Food and Agriculture Organization of the United Nations (FAO) and WHO have cooperated in the development of such forecasting models by promoting cooperation among experts, sharing feedback and experiences from past outbreaks, identifying gaps and exploring potential improvements in existing outbreak models. To further this effort, FAO and WHO invited a group of experts on modelling and forecasting outbreaks of Rift Valley fever to a two-day workshop in 2008 to share feedback from the outbreaks in the period 2006-2008, share experiences, identify gaps and explore the possibility of improving Rift Valley fever outbreak models. The objectives of the workshop were to review the history of Rift Valley fever, review the forecasting models and risk distribution maps that were available or being developed and make proposals on how those tools might be improved. The final goal was to prepare a road map, in the form of recommendations, for the development of tools for forecasting outbreaks of Rift Valley fever and for the real-time analysis of the spread of Rift Valley fever during outbreaks.

Japanese encephalitis

66. Japanese encephalitis is a viral disease that infects animals and humans, mostly in South Asia and South-East Asia. The disease is transmitted by mosquitoes belonging to the subgroups *Culex tritaeniorhynchus* and *Culex vishnui*, which breed in flooded rice fields. With the expansion of irrigated rice production systems into semi-arid areas, the flooding of the fields at the start of each cropping cycle leads to an explosive build-up of the mosquito population. This may cause the circulation of the virus to spill over from the usual hosts (birds and pigs) into the human population.

67. In a mini-project of the Japan Aerospace Exploration Agency, a risk map of Japanese encephalitis in mid- and far-western Nepal was developed based on a study of the relationship between the disease and climatic and environmental

variables. The study used satellite information on land use, digital elevation models, precipitation, vegetation and land surface temperature and examined the relationship between climatic and environmental data and medical data to estimate risk.

Early warning for other zoonotic diseases

68. A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Animals thus play an essential role in maintaining zoonotic infections. Zoonoses may be bacterial, viral or parasitic, or they may involve unconventional agents. In addition to Rift Valley fever and Japanese encephalitis, which are mentioned in the preceding paragraphs, other zoonotic diseases that have recently been the subject of increased public and media attention include anthrax, bovine spongiform encephalopathy (also known as mad cow disease), Crimean-Congo haemorrhagic fever, highly pathogenic avian influenza and the Ebola virus disease.

69. Since July 2006, outbreaks of major animal diseases have been monitored worldwide by the Global Early Warning and Response System for Major Animal Diseases, including Zoonoses, a joint system that builds on the added value of combining and coordinating the alert and disease intelligence mechanisms of FAO, WHO and the World Organization for Animal Health, for the international community and stakeholders to assist in prediction, prevention and control of threats of animal disease, including zoonoses, through the sharing of information, epidemiological analysis and joint risk assessment.

70. Early warning is based on the concept that dealing with a disease epidemic in its early stages is easier and more economical than having to deal with it once it is widespread. Satellite-derived information on climatic factors is combined with economic indicators and migration statistics and is further integrated in epidemiological analysis for predicting disease threats. From a public health perspective, early warning of outbreaks with a known zoonotic potential will facilitate the development of control measures and the formulation of relevant preventive policies.

71. In addition, biologists, scientific researchers and conservation agencies employ space science and technology for tracking wildlife. Applications using global navigation satellite systems (GNSS) allow the scientific community to remotely observe relatively fine-scale movement or migratory patterns in a free-ranging wild animal, the size of an animal's home range, what other animals share an animal's range and the types of habitats an animal uses. This information can provide insights on approaches in controlling animal populations and help determine relevant interventions with regard to observed species.

72. Furthermore, outer space provides a unique opportunity for microgravity studies of various zoonotic agents. As the microgravity environment in outer space resembles human intra-intestinal conditions, both having a similar level of fluid shear, a so-called mechanical force related to the motion of fluids passing over cells, bacteria of the genus *Salmonella* were sent to ISS aboard two space shuttle missions, in 2006 and 2008, for experiments. Salmonella is a leading cause of food poisoning (salmonellosis) and related illnesses, whose symptoms include diarrhoea, fever, vomiting and abdominal cramps. The research findings, including those on a higher degree of virulence of the bacteria cultured in orbit, could provide a

foundation for the development of new therapies and vaccines to combat salmonella infections in humans.

G. Responding to global epidemics

Ebola virus disease

73. The Ebola virus disease, formerly known as Ebola haemorrhagic fever, is a severe, often fatal illness in humans. The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission. The average case fatality rate of the disease is about 50 per cent.

74. The General Assembly, in its resolution 69/85, expressed its deep concern about the devastating effects of infectious diseases, in particular the Ebola virus disease, to the detriment of human life, society and development, urging the international community, in particular scientific and academic institutions, to undertake studies on the role of tele-epidemiology in monitoring, preparedness and response activities.

75. In August 2014, the Ebola Crisis Cell of the Department of Peacekeeping Operations and the Department of Field Support of the Secretariat was established to monitor and advise senior management on the development of the Ebola crisis. The General Assembly, in its resolution 69/1, welcomed the intention of the Secretary-General to establish the United Nations Mission for Ebola Emergency Response (UNMEER).[9] In its resolution 2177 (2014), the Security Council reiterated its appreciation for the appointments by the Secretary-General of the United Nations System Senior Coordinator for Ebola Virus Disease and the Deputy Ebola Coordinator and Emergency Crisis Manager.

76. Throughout the recent Ebola outbreak, space-based technologies provided a better understanding of the dynamics of the outbreak, the environment it was spreading in and the resources available to assist affected populations and local governments in their response. Geospatial analytical products provided by the Cartographic Section of the Department of Field Support improved the situational awareness, analysis and monitoring capabilities of the Ebola Crisis Cell by depicting the evolution of the spread of the Ebola virus.

77. From the first day of the UNMEER operations, the Cartographic Section deployed experts on geospatial information services to UNMEER headquarters and provided, jointly with UNMEER, GIS products and services to support mission situational awareness, planning, remote monitoring and surveillance, ensuring that all mission components and global Ebola response partners were equipped with suitable geospatial information to support their operations and the mission's mandate.

78. Global Ebola response partners used Global Positioning System (GPS) technology to collect valuable data on Ebola treatment centres, community care centres, laboratories, safe burial teams and Ebola patient contact tracing. Thus, this technology provided valuable input to the global Ebola response and the UNMEER database of geographical and spatial data.

[9] See A/69/389-S/2014/679.

79. Satellite imagery played an important role in monitoring the construction of Ebola treatment centres and in developing the products referred to in the previous paragraph. Emergency treatment centres had to be constructed in remote areas, with limited road access, in countries affected by the Ebola outbreak; satellite imagery provided unique and affordable opportunities to remotely monitor on a regular basis the progress of the construction of those treatment centres. Collected and processed information, integrated in analytical geospatial products provided to the emergency response management, helped to estimate the geographical coverage of treatment centres, as well as their accessibility and capacity in relation to the number of new cases in the region.

80. During the Ebola outbreak, one of the critical components of the emergency response was safe burials that would ensure that the deceased Ebola patients were buried in a safe and dignified manner and that the virus was not transmitted to the relatives, villagers and neighbours of the deceased. Safe burial teams had to travel extensively to remote locations with poor road conditions that would worsen during the rainy season. Geospatial data for remote areas were often non-existent. Satellite imagery and remote-sensing technologies provided an extremely valuable contribution to enrich geospatial databases, analyse road conditions and accessibility and provide options for travelling to the destinations.

81. In 2014, during the outbreak of the Ebola virus disease, the virus quickly spread across national borders, severely affecting Guinea, Liberia and Sierra Leone and, to a lesser extent, Mali and Senegal. Ebola-infected persons crossed borders, spreading the disease to neighbouring countries. Owing to the remote locations of the Ebola-infected persons and unofficial border crossings, geospatial data related to infrastructure along international borders were often unavailable or unreliable. Data extracted from satellite imagery made possible the enrichment of databases and provided analysis on how Ebola vectors travel across countries.

82. Geospatial visualization supported by satellite imagery has been effectively used to bring the outbreak of the Ebola virus disease to the immediate attention of international communities and the United Nations, including the Security Council and the General Assembly, to identify the rapid geographical spread of the disease and to help make an immediate, evidence-based decision to assist in the global Ebola response.

H. Employing space technology in disaster and emergency situations

83. Hazard mapping is playing an increasingly important role in early warning systems. That, coupled with the ability to map out resources, enables accurate and tailored emergency planning. In that context, the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) of the Office for Outer Space Affairs, was established to provide universal access to all types of space-based information and services relevant to disaster management to support the full disaster management cycle. UN-SPIDER serves as a gateway to space-based information for disaster management support, a bridge to connect the disaster management and space communities and a facilitator of capacity-building and institutional strengthening, in particular for developing countries.

84. GIS data sets on refugee camps and sites will better support the management of health issues, supply distribution and security and telecommunication issues. Refugees in urban areas present challenges different from those of refugees protected by the Office of the United Nations High Commissioner for Refugees (UNHCR) in camps. UNHCR has therefore extensively used satellite imagery to map the location of refugees and their access to assistance and protection in large cities such as Cairo, Damascus and Nairobi.

85. The use of satellite imagery during humanitarian crises is becoming more common. Combined with field assessment, this technology makes it possible to provide a complete picture of inflicted damage. While remote-sensing technology provides near-real-time information on areas of limited accessibility during and immediately after the conflict, field surveys supplement the assessment by detecting destruction not visible from above, such as damage to walls and other interior structures. The Operational Satellite Applications Programme of the United Nations Institute for Training and Research provides damage assessments during and after conflict situations.

I. Harnessing International Space Station benefits for health

Space benefits for health

86. Since the first human space flight in 1961, opportunities to conduct science experiments stretched beyond the Earth's surface and atmosphere. ISS, the largest, most complex and most long-standing international cooperation endeavour in outer space to date, has carried out research, technological development and testing, operational activities, medical procedures and other health-related projects.

87. Examples of research conducted on or for ISS relate to space life sciences, the health of astronauts and cosmonauts and health research. Studies have been carried out to examine the adverse effects of the microgravity environment on the human body, such as balance disorders, cardiovascular deconditioning, bone demineralization and muscle disuse atrophy; the effects of cosmic radiation and the reduction of immune responses; and the psychosocial impact of a closed, confined and multicultural environment.

88. Technology development and testing on or for space activities often produce incidental benefits or pay-offs for everyday technology in health care on Earth. The directly applicable or spin-off/spin-in/spin-through technologies led to advances in new materials, devices, procedures and organizational systems used in health care. Materials initially developed for space flights can be found in daily life in lightweight wheelchairs, scratch-resistant lenses, invisible braces or first aid thermal blankets. Magnetic resonance imaging (MRI), computed tomography and infrared ear thermometers are examples of spin-off devices.

89. Operational activities and procedures on or for space activities and ISS in areas such as logistics, software development and crew medical care led to advancements in telemedicine, macromolecular crystallization and water recycling technology. Robotic arms technology contributed not only to the development of prosthetic devices, but also to enhancements in MRI-compatible neurosurgical procedures.

90. The Office for Outer Space Affairs, under the framework of its Human Space Technology Initiative, organized a series of expert meetings to highlight potential benefits of human spaceflight for development. The series of meetings included the United Nations/Malaysia Expert Meeting on Human Space Technology, held in Putrajaya, Malaysia, in November 2011 (see A/AC.105/1017), and the United Nations Expert Meeting on the International Space Station Benefits for Humanity, held in Vienna in June 2012 (see A/AC.105/1024).

91. The Office for Outer Space Affairs also organized the United Nations Expert Meeting on the International Space Station Benefits for Health, held in Vienna in February 2014 (see A/AC.105/1069). The meeting focused on facilitating dialogue between the public health community and the space community and discussed the identification of potential synergies between the stakeholders. As follow-up, a meeting on applications of space science and technology for public health will be organized by the Office and WHO in Geneva on 15 and 16 June 2015.

J. Addressing impact of space environment

Cosmic radiation

92. Radiation is a fact of life. Naturally occurring ionizing radiation comes from a variety of sources, including sources in the Earth's crust (terrestrial radiation), sources in the human body and astronomical sources (cosmic radiation). Cosmic radiation, which comes from the Sun and other celestial objects, accounts for about half of the natural background radiation to which the world population is exposed. Because of its high energy, cosmic radiation could pose a danger to human health, but humans on Earth are shielded from most cosmic rays by the planet's magnetic field and atmosphere.

93. While interplanetary manned missions that go beyond the Earth's magnetosphere will not be protected from the space environment by the planet's magnetic shield, the crew on board ISS and its Earth-bound analogues still have the limited protection of the magnetosphere. Nevertheless, astronauts and cosmonauts are exposed to high levels of cosmic radiation, which has an adverse effect on the human body. Cosmic radiation has been shown to decrease the level of lymphocytes, thus weakening the body's immune system, and has been linked to a higher incidence of cataracts in astronauts and cosmonauts.

94. In 2014, the International Atomic Energy Agency (IAEA) published *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards — General Safety Requirements*,[10] as part of its endeavour to protect people and the environment from the harmful effects of ionizing radiation. The IAEA standards outline responsibilities of Governments in existing exposure situations, such as exposure due to natural sources, and stipulate requirements for occupational exposure of aircrew and space crew due to cosmic radiation. While the requirements of the IAEA standards with respect to dose limits do not apply to individuals in space-based activities, all reasonable efforts should be made to optimize protection

[10] *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards — General Safety Requirements*, IAEA Safety Standards Series No. GSR Part 3 (International Atomic Energy Agency, Vienna, 2014).

for individuals in space-based activities by restricting the doses received by such individuals while not unduly limiting the extent of such activities.

95. The standards are jointly sponsored by the European Commission, FAO, IAEA, the International Labour Organization, the OECD Nuclear Energy Agency of the Organization for Economic Cooperation and Development, the Pan American Health Organization, UNEP and WHO.

Space weather

96. Space weather refers to variable environmental conditions within the solar system, including global phenomena driven by large solar eruptions that impact on large areas of the Earth simultaneously. In the area of public health, it is important to understand the possible effects of solar activity and variations in the Earth's magnetic field on human health. For example, research has demonstrated that the majority of magnetic storms are followed by an increase in hospitalization of patients with cardiovascular and nervous diseases.

97. At its fifty-second session, in 2009, the Committee on the Peaceful Uses of Outer Space noted the importance of continuing to build upon the success of the International Heliophysical Year 2007, in particular by deepening the understanding of the function of the Sun and its effects on the Earth's magnetosphere, environment and climate, and noted with satisfaction the agreement reached by the Scientific and Technical Subcommittee at its forty-sixth session to consider, beginning at its forty-seventh session, a new agenda item entitled "International Space Weather Initiative" under a three-year workplan with specific focus on the effects of space weather on the Earth and its impact, inter alia, on communications and transport (A/64/20, para. 155). At its fifty-fifth session, in 2012, the Committee agreed that the Subcommittee should include on its agenda, starting from its fiftieth session, in 2013, a new regular item entitled "Space weather" (A/67/20, para. 166). At its fiftieth session, in 2013, the Subcommittee noted that, through that item, it could serve as an important advocate for efforts to close existing gaps in the space weather research field (A/AC.105/1038, para. 156). At its fifty-second session, in 2015, the Subcommittee noted with satisfaction that during its session the newly established Expert Group on Space Weather had met under the leadership of Canada and had presented its multi-year workplan, which was subsequently endorsed by the Subcommittee (A/AC.105/1088, paras. 163-169).

98. The Office for Outer Space Affairs, under the framework of its Basic Space Science Initiative, organized the United Nations/Japan Workshop on Space Weather: Science and Data Products from International Space Weather Initiative Instruments, in Fukuoka, Japan, in March 2015 with the overall objective of providing a global forum to discuss capacity-building, global observation and space weather education. In February 2015, the Office, in its capacity as the executive secretariat of the International Committee on Global Navigation Satellite Systems, organized a course on the theme "Space weather and global navigation satellite systems: the Ionosphere and Earth's magnetic field" in Rabat, focusing on building capacities in the area of space weather using existing data from GPS/GNSS stations in Africa. Those activities were aimed at promoting cooperation in the standardization, sharing and timely use of space weather data, which constitute the basis for research on health issues related to space weather.

III. Public health as a pillar in the 2018 "UNISPACE+50" theme of the Committee on the Peaceful Uses of Outer Space

99. The year 2018 marks the fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in Vienna in 1968. The Legal Subcommittee at its fifty-fourth session (A/AC.105/1090, paras. 233-234) and the Scientific and Technical Subcommittee at its fifty-second session, in 2015, agreed to the main proposal made by the past, present and incoming chairs of the Committee on the Peaceful Uses of Outer Space, whereby the commemoration in 2018 would be a fitting time to take stock of the contributions of the three UNISPACE conferences to global space governance. As agreed by the Scientific and Technical Subcommittee, the preparatory work for 2018 could benefit from the work of the expert group on space and global health (A/AC.105/1088, para. 69, and annex I, paras. 3-4).

100. In this context, the present report serves as a contribution to the work of the expert group on space and global health and the preparations for the 2018 "UNISPACE+50" theme of the Committee and its subsidiary bodies. In that regard, the following areas could serve as examples for further consideration:

(a) Raising awareness of the potential contribution of space technology and applications to global health;

(b) Engaging with users, researchers, decision makers and other stakeholders in the public health sector to identify further needs in tools and data that could be provided with the means of space technology and its applications;

(c) Strengthening capacities in terms of the discovery of, access to and processing and use of space-derived data and information and furthering the development of relevant tools and information systems;

(d) Promoting institutional development by focusing on advancing the integration of space-derived data and information into the decision-making processes in public health;

(e) Supporting the harmonized use of space technology in public health through the standardization and updating of space-derived information, with a view to eliminating duplication and overlap;

(f) Promoting international cooperation for increased use of space-derived data and information for planning and decision-making processes in public health, including for the mitigation of impacts of humanitarian crises.